First Copy

The TOOL ENGINEER

Morse Tool Company, Detroit, Michigan—an excellent example of tool engineering efficiency, in plant layout as well as quality and ingenuity of products produced, widely used by Tool Engineers throughout the country.
For full details see page 20.

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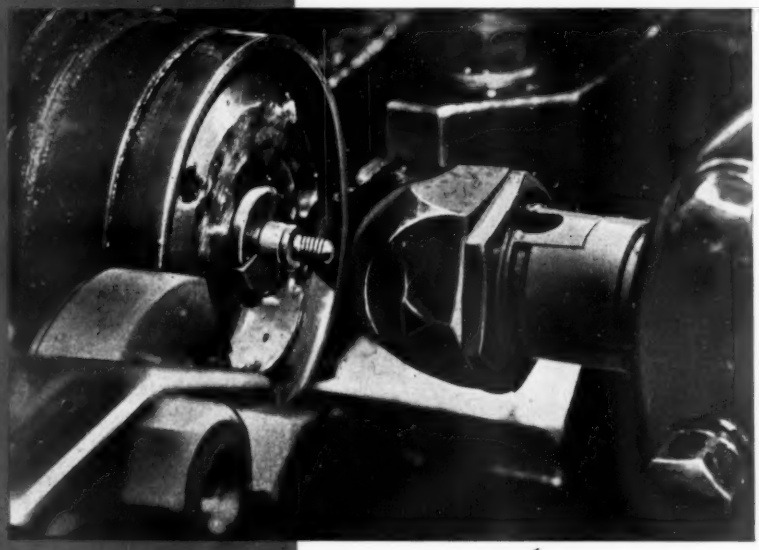
JUNE
1937

Official Publication of the
AMERICAN SOCIETY
OF TOOL ENGINEERS

Duocone Dies

for fast, accurate, low cost threading



At the left is a typical installation showing a P&W Duocone Die operating on a small threaded part in an automatic screw machine.

The new P&W Duocone Die is a light, strong, compact tool, designed primarily for use in screw machines. It is equally efficient in bolt-cutters, drill presses and turret lathes. It is designed so that fine, accurate adjustment is possible, and at the same time it is very simple to re-grind. Smooth, accurate threads are produced with the die operating at fairly high speeds. The Duocone feature (opposed tapers) insures correct alignment with the axis of the holder.

The P&W Duocone Die can be furnished in either carbon or high speed steel, with reversing or releasing type holders. At the left are two of the dies without holders, showing their opposed taper construction.

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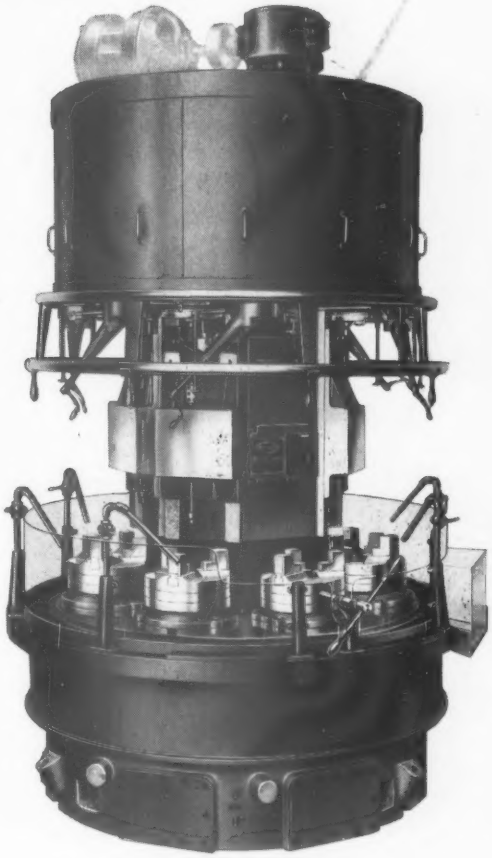

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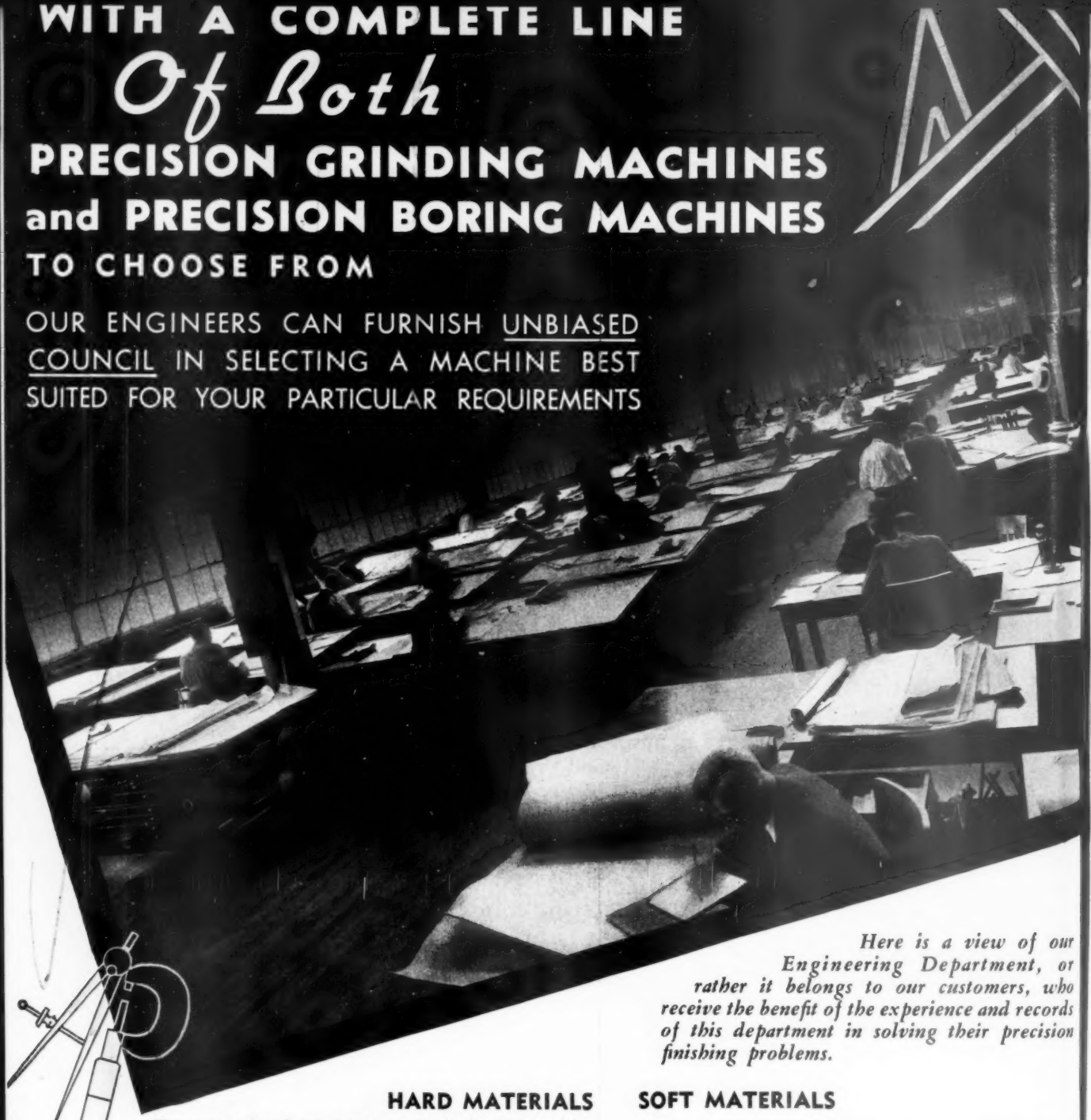
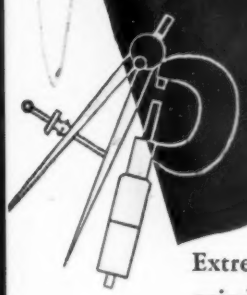


Here is a view of our Engineering Department, or rather it belongs to our customers, who receive the benefit of the experience and records of this department in solving their precision finishing problems.



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Extremely hard materials can only be finished by grinding. Whether it is a tool room job covering a wide variety of parts or mass production of work with a single operation, there is one of our many styles and sizes of Internals, Plain — Semi-Automatic — Fully Automatic, that will exactly handle the job.

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Where the work is bronze, aluminum, cast iron or soft steel, whether it is precision boring, facing, turning or grooving, one of our many styles of "Bore-Matic" precision boring machines will give more consistently: closer accuracy, better finish and more production than by any other method.

Write for our new installation bulletin that covers set-ups in your particular industry.

THE *Heald* MACHINE COMPANY
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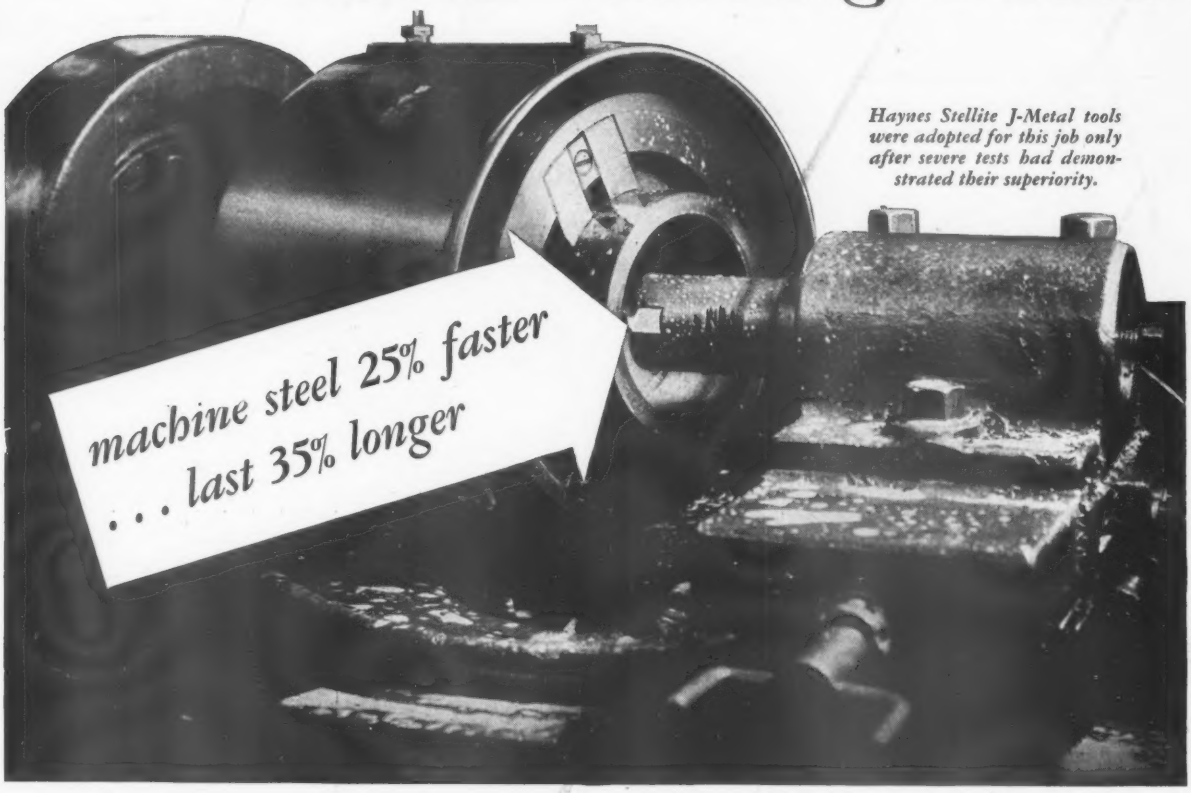
HAYNES STELLITE J-METAL *Cutting Tools*



Haynes Stellite J-Metal tools were adopted for this job only after severe tests had demonstrated their superiority.

THIS shows a half-inch square Haynes Stellite J-Metal tool rough-boring an outer race for a self-aligning ball bearing, made of SAE 52100 steel. Cutting speed is 144 feet per minute, with a water and oil lubricant. The feed is .009 inches per revolution, with a depth of cut of .020 to .095 inches. The floor-to-floor time per piece is one minute. This represents an increase in production speed of 25 per cent. In addition the Haynes Stellite J-Metal tools last *35 per cent longer between grinds.*

Specific data on applications in which you are interested will be furnished on request, or one of our engineers will be glad to assist you in your machining problems. This service is available without obligation.

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The Tool Engineer

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Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. VI JUNE, 1937 No. 2

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The Tool Engineer is published on the first Thursday of each month. It is the official publication of the American Society of Tool Engineers, Incorporated. The membership of the Society and readers of this publication are practical manufacturing executives such as master mechanics, works managers, Tool Engineers, tool designers and others who are responsible for production in mass manufacturing plants throughout the nation and in some foreign countries.

Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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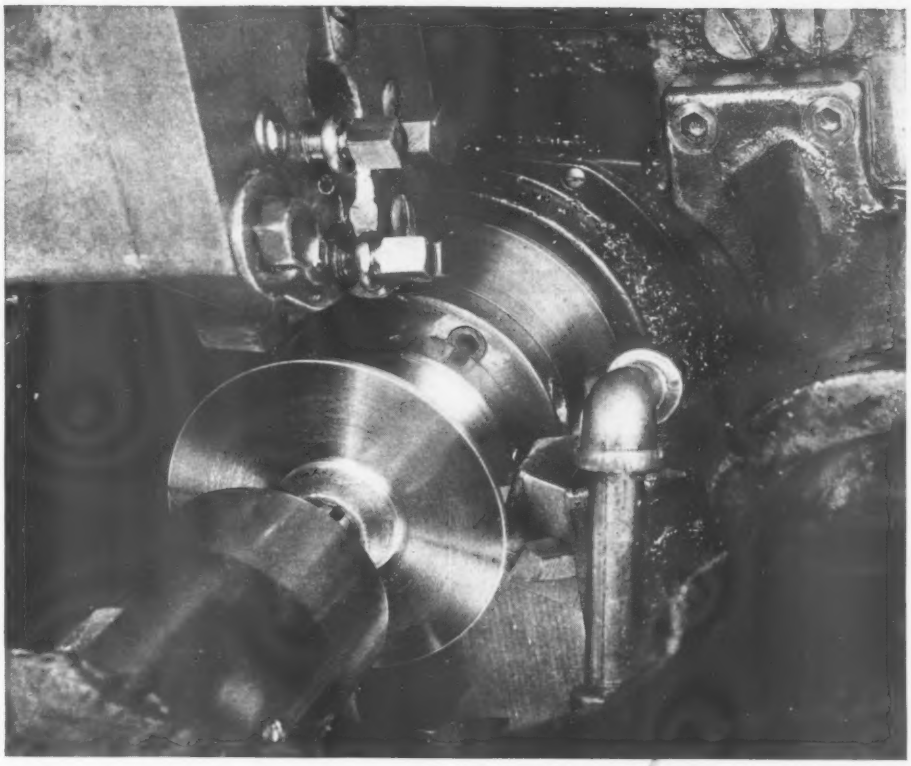

Machining forged clutch hub. Material: S.A.E. 1020 average Brinell 190. Operations-Straddle machine the faces, turn the O.D., and size the hub. Comparative performance of Vascoloy-Ramet (grades D, DW and E) and high speed steel:

Vascoloy-Ramet	Feet Per Min.	Feed	Depth	Pieces Per Grind
Grade D (Nov. 1934)	275	.020″	3-64″—5-16″	200
Grade DW (July 1936)	275	.020″	3-64″—5-16″	300
Grade E (Feb. 1937)	275	.020″	3-64″—5-16″	625
High speed steel	80	.020″	3-64″—5-16″	65

Here is an amazing record from November 1934 to February 1937, of identical machining operations, with the same material, on the same machines, by the same operators.

Each newly developed grade of Vascoloy-Ramet shows progressively increased production and economy of operation. For example, Grade D produced 135 more pieces per grind, Grade DW, 235, and Grade E, 560, compared with high speed steel.

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Today, great industrial plants and small machine shops, alike, are finding "a grade for every use" the secret of faster production, more pieces per grind and lower operating costs.

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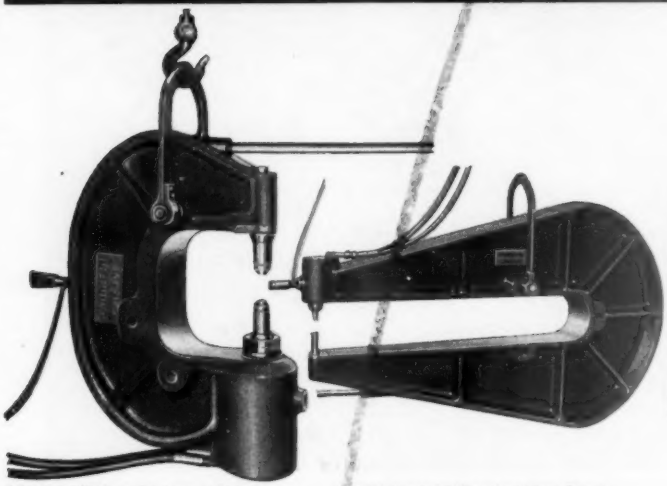
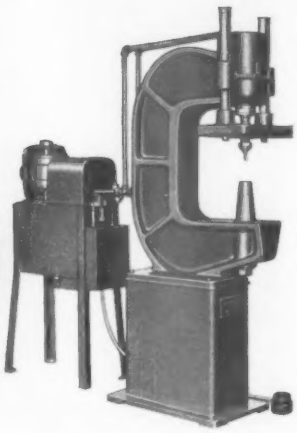
A GRADE FOR EVERY USE

NEW "hy-power" HIGH SPEED RIVETERS



35 ton portable yoke riveter. Reach 12 in., gap 9 in., stroke 3½ in., capacity ½ in. cold rivets, time cycle 3 seconds.

17½ ton portable yoke riveter. Reach 6 ft., gap 8⅝ in., stroke 3 in., capacity ⅜ in. cold rivets, time cycle 2½ seconds.



35 ton punch and riveter adaptable to a variety of work. Has platen for mounting strippers. Reach 15 in., gap 13⅝ in., stroke 5 in., time cycle 4 seconds.

Capacities 2 tons to 50 tons—speeds 1½ to 3 seconds per cycle

Hannifin "Hy-Power" hydraulic riveting presses deliver an entirely new standard of fast and easy handling on any type of riveting from light sheets to structural shop jobs and railroad car work. The portable yoke riveters illustrated may be suspended from top, bottom, or side to reach work at any angle. Time cycle for the 50 ton riveter with 4 inch stroke is 3 seconds.

"Hy-Power" hydraulic riveters are push button controlled, with power furnished by the compact motor driven hydraulic pressure generator. The riveter cycle is automatically completed upon pressing the control button. The cycle includes —1. Rapid advance stroke at moderate pressure until the die touches the rivet; 2. Automatic high pressure to head the rivet; 3. Automatic reversal at peak pressure; 4. Rapid return to starting position. The oil pump idles at zero pressure between cycles.

Hannifin "Hy-Power" riveters are complete, self-contained units with either portable or stationary riveter heads, "Hy-Power" hydraulic pressure generator, and push button control. Capacities 2 tons to 50 tons or more. Write for Bulletin 39 with complete data.

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Drilling, Reaming and Tapping

Introduction

by

HOMER C. BAYLISS

Technical Editor, for This Issue

This issue should be of great interest to Tool Engineers, because it deals with an ever present production problem. Compared to other manufacturing processes such as broaching, milling, turning and grinding, it is probable that there is more drilling and reaming of holes to be done on the average part than any other process. Therefore, being the largest field it offers the greatest opportunity for the Engineer to effect savings. A careful perusal of the following articles will enable a man with an engineering mind to pick out several sound principles of design which will be helpful in attacking future problems. One could—with profit, read this issue while holding in the other hand the "Tool Engineer" issue of October 1936. In that issue, Mr. Charles J. Martin enunciated nineteen fundamental principles of tool and fixture design that offer an excellent yardstick for testing any new special tooling. The student will find it interesting to see how many of Mr. Martin's points are covered in the descriptive articles published herewith.

Young men who read this issue should not be easily discouraged and feel that machine and tool design have reached the pinnacle of human ingenuity and that no further improvement is possible. We should all remember that multiple drilling and tapping have had their greatest development in the last ten years and any practice so young lends itself to refinement as time and experience reveal oversights. For instance, the advent of new alloys in tools enables the designer to use higher speeds. In many cases an increase in horsepower was adopted without proof of its necessity being available. Undoubtedly, many a young engineer could save his employer many times his annual salary just by a study of the power factor required by machines and tools and follow his study with a general replacing of oversized motors with adequate motors of smaller horsepower.

Tool Engineers should be alert to the fact that more and more attention is going to be given in the future to the appearance of machine tools. The influence of the industrial artist will be seen on the tools that go into your plant in the months to come. Therefore, it would be well to add a Twentieth checkpoint on your fixture design list and that is: "Does it look as though it were an integral part of the machine for which it is intended?"

The Editorial Committee wishes to take this opportunity of thanking the many contributors for their splendid articles for this June issue. Space does not permit the printing of all of them in this issue, but we expect that all articles submitted will be printed in subsequent issues as space allows.

Letters

The Tool Engineer comes to us regularly and we find the information contained in it instructive.

We have been particularly interested in the Patent articles written by Everett G. Wright. We wanted to review some of his articles and find that the issues of the Tool Engineer containing his first three articles are missing.

Can you supply us with the back numbers containing Mr. Wright's first three articles? If so, please advise us what your charges will be and we will send a remittance with our order for them.

Thanking you for your advice, we remain
Yours very truly,
Worcester Lawn Mower Co.
Frank T. Farmer, Factory Manager

We have no copies on hand of the issues requested. We, therefore, have asked Mr. Wright, the author of the series "Patents" to communicate with you direct.—Ed.

▼ ▼ ▼

A copy of your magazine was handed to me the other day and in just glancing through it I became immensely interested in it and would appreciate a little information relative to the American Society of Tool Engineers. What are your requirements for a person to become eligible for membership in your society? At present I am employed with one of the large industrial concerns in Chicago, in its Experimental and Engineering Department.

I noticed you offer a senior grade membership and a Junior membership, and would appreciate a brief explanation relative to the difference of these two memberships and what each has to offer.

Thanking you in advance for your favor, I remain, Yours truly,
N. Arvid Peterson,
1828 So. 50th Ave.
Cicero, Ill.

Complete information has been sent to you direct from A.S.T.E. headquarters in Detroit. Also we suggest you communicate with Mr. M. A. Blu, Chairman Chicago Chapter, who may be reached at 3333 Washington Boulevard, care Sears Roebuck & Co.—Ed.

▼ ▼ ▼

Please send me a sample copy or other information regarding your magazine "Tool Engineer." I have heard of the excellent material in this magazine and would like to be a subscriber to the magazine. I am a tool designer employed by The Lima Locomotive Works at Lima, Ohio.

Yours very truly,
A. E. Feightner, R.F.D. No. 1,
Elida, Ohio

A sample copy has been mailed to you. As a tool designer you will find the A.S.T.E. of vital interest and importance to you.—Ed.

▼ ▼ ▼

1926 East 89th St.,
Cleveland, Ohio

Since this is the first time it has been my pleasure to contact you, may I congratulate you on the make-up and interesting information for which the magazine "Tool Engineer" is fast becoming noted. I have enjoyed every issue and note the improvement in each succeeding issue.

Sincerely yours, W. J. Balkwill,
Cleveland Chairman of Meetings Committee

We thank you, Mr. Balkwill, for your encouragement, and hope that we can continue (as we will constantly endeavor to improve) the quality of "The Tool Engineer" with each succeeding issue. Tell us, too, what you want to make it more valuable and interesting to you.—Ed.

TOOL ENGINEERING as APPLIED to MULTIPLE DRILLING and TAPPING

By

E. A. HARPER

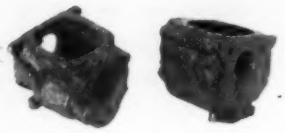
Member A.S.T.E.

National Automatic Tool Company

WHEN ANALYZING DRILLING AND TAPPING problems, the Tool Engineer finds that it is of prime importance to first consider the method. This enables him to determine whether it is possible to perform one operation, or a group of operations, with one handling, as well as to determine the possibilities of reducing floor space and cutting labor cost. Once the method is decided, the matter of choosing the machine is comparatively simple.

Sometime ago, we were called upon to tool up a transmission case. The purchaser wished to obtain a maximum production at minimum labor cost. We gave this considerable study and developed the following sequence of operations for drilling, countersinking, counterboring, reaming and tapping both ends.

To accomplish this, we used an 8-position trunnion type fixture, suitable to hold one part in each position while performing the following operations on two-way horizontal drilling machines.



The problem at hand was the tooling of this transmission case.

Operations—First Machine

Position 1, Remove the load one of either of the three transmission cases with front end to the left.

Position 2, Left Head—Drill 2 holes $\frac{11}{16}$" diameter. Drill 3 holes $\frac{17}{32}$" diameter. Drill 1 hole for .531" ream. Drill 1 hole for .8735" ream.

Right Head—Drill 2 holes $\frac{7}{16}$" diameter. Drill 1 hole for .8785 ream. Drill 1 hole $\frac{15}{16}$" diameter.

Position 3, Left Head—Drill 5 holes for $\frac{5}{16}$-18 tap in two transmission cases.

Right Head—Drill 4 holes for $\frac{7}{16}$-14 tap. Drill 1 hole $\frac{5}{16}$" diameter in transmission case in one location. Drill 1 hole $\frac{5}{16}$" diameter in two transmission cases in another location.

Position 4, Left Head—Countersink 5 holes drilled for $\frac{5}{16}$-18 tap in two transmission cases.

Right Head—Countersink 4 holes drilled for $\frac{7}{16}$-14 tap.

Position 5, Left Head—Tap 5 holes $\frac{5}{16}$-18 thread in two transmission cases.

Right Head—Tap 4 holes $\frac{7}{16}$-14 thread.

Position 6, Left Head—Drill 2 holes for .619" ream through inside bosses. Drill 1 hole, ½" diameter, in one transmission case only.

Right Head—Drill 2 holes for .619" ream through inside bosses. Drill 1 hole for .860" ream through one inside boss.

Position 7, Left Head—Semi-finish ream 2 holes for .619" ream. Ream 1 hole .531" diameter. Ream 1 hole .8735" diameter.

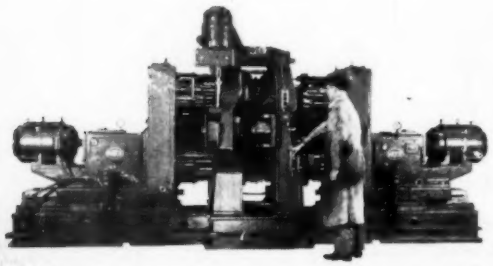
Right Head—Drill 1 hole for .860" ream through second inside boss. Semi-finish ream 2 holes for .619" ream through inside bosses.

Ream 1 hole .8785" diameter.

Position 8, Left Head—Chamfer 1 hole, ½" diameter, in one transmission case only.

Right Head—Counterbore 2 holes, $\frac{11}{16}$" diameter to .879" diameter, ⅛" deep. Chamfer 1 hole $\frac{5}{16}$" diameter drill in one transmission case in one location. Chamfer 1 hole, $\frac{5}{16}$" diameter drill in two transmission cases in another location. Ream 1 hole $\frac{15}{16}$" diameter.

The first machine described: it does all the operations required for both ends of the transmission case.



These operations were performed in a Natco two-way horizontal combination drilling and tapping machine, which was built up of Natco Holeunits and included a reversing motor drive tapping unit. The drilling units contained a total of 51 drilling spindles, with nose adjustment, mounted in anti-friction bearings. The tapping units had a total of 9 individual lead screw tapping spindles, with trunnions arranged for automatic indexing. A photographs of this machine is shown.

Operations—Second Machine

After these operations were completed, the part was removed and placed in another machine where the following operations were performed: The drilling, countersinking, reaming and tapping of both sides, also the top and the bottom.

We used a 4-position trunnion type fixture suitable to hold two transmission cases in each position, one part in place so as to be machined on the two sides, the other part in place so as to be machined top and bottom on a 2-Way horizontal machine. Location for part to be machined on the two sides is known as "A", location for the part to be machined on the top and bottom is known as "B".

Position 1, Unload one completed part, relocate one semi-completed part and load one new part.

Position 2, Location "A", Left Head—Drill 3 holes for ⅜" tap in one transmission case only. Drill 1 hole for ⅜" tap in all parts. Drill 2 holes for ⅜" tap in two transmission cases only.

Location "A", Right Head—Drill 2 holes for ⅜" tap in two transmission cases. Drill 3 holes for $\frac{7}{16}$" tap in one transmission case only.

Position 2, Location "B", Left Head—Drill 5 holes for ⅜" tap in all parts. Drill 2 holes for .378" ream in all parts. Also chamfer these holes with combination tools.

Location "B", Right Head—Drill 1 hole for ½" pipe tap in all parts. Drill 2 holes for ⅜" tap in one transmission case only.

Position 3, Location "A", Left and Right Heads — Countersink holes drilled in position No. 2 spotfacing 2 bosses with combination tools where required.

Location "B", Left Head—Counter-

(Continued on Page 36)

SELECTIVE INDEX DRILLING

By

J. M. RIORDAN

RIORDAN MACHINERY COMPANY

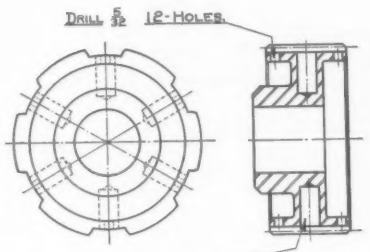
In the application of automatic drilling equipment to the production problems presented in the machine industry, many interesting and unusual sequences of operations are encountered, one of which is applicable to the part shown in the drawing and the operations in connection therewith can be performed on Kingsbury equipment to considerable advantage.

The six .339" holes are evenly spaced and are to be drilled, counterbored to a square bottom and reamed to a decimal dimension. Adjacent to these holes and on the same spacing are twelve 5/32" holes through the outer rim of the part, and for the production of these in quantities, ordinarily, several handlings would be necessary with their attendant possibilities of error.

Obviously, the part could be located over an arbor or stud and the six large holes drilled in that position. It could then be removed from that arbor, rotatively re-located correctly and the counterboring operation performed; each case of course, requiring a set-up where the six drills might operate, one on each of the respective holes shown. A third set-up might be necessary for the reaming of the holes and a fourth for the drilling of the two 5/32" holes next adjacent to the .339" holes.

Obviously, this method of procedure would provide possibilities of error and require several handlings which were recognized by the Kingsbury Machine Tool Corp. engineers when requested to quote on equipment for these operations, and the result of their study, is a machine shown in the illustration and its novel features are; that one piece of work only is placed on the operating dial—the work being in axial alignment with the dial itself—and the work is held rigidly; a bushing bracket or mount is fastened securely to the non-rotating members of the indexing mechanism in order that tools may be guided in bushings to assure the accuracy demanded.

A six-station mechanism was then arranged to operate one and one-half revolutions for the completion of the work in combination with permitting the respective drilling units to perform their functions at the proper time only and detain the reaming tool from feeding into a hole before it was completely drilled and bottomed.



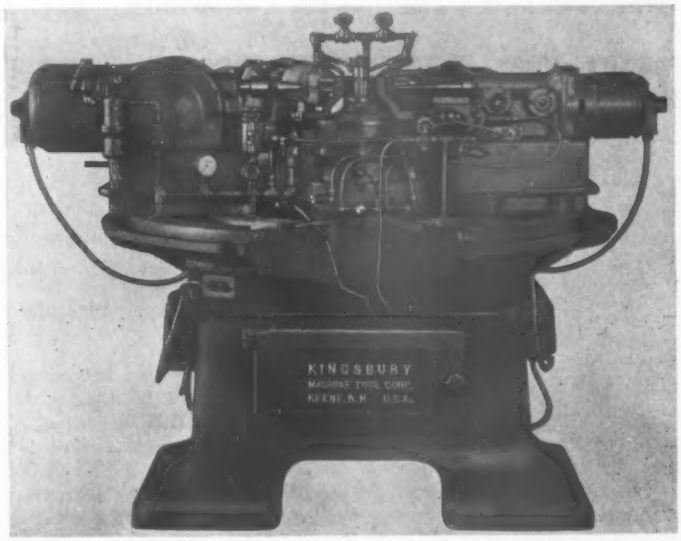
This is the part.

The operation of this machine is as follows:

After the operator loads and securely clamps the work, the trip lever for starting the machine is depressed. The drilling units in Stations No. 1 and No. 2 immediately start the drilling of the .339" reamer holes and the two 5/32" through holes, on the completion of which the machine automatically cycles to the next station and the drilling units in Stations No. 1 and No. 2 again complete their operations. During these first two cycles, the drilling units in Stations Nos. 3 and 4 have been stationary, but on the third index, the unit in Station No. 3 joins with units No. 1 and No. 2 and counterbores to the bottom of the .339" hole drilled in Station No. 1. On the next index, unit No. 4 starts its function and reams the first hole past the point that has been drilled and counterbored. On the fifth and the sixth indexes, all the four heads shown function. On the seventh index, units No. 1 and No. 2 are idle. On the eighth index, the last .339" hole will have been counterbored and unit No. 3 ceases to function so that on the ninth index, the reaming of the last hole is performed, and the machine's cycle is completed.

It is not necessary to allow three idle indexes between the unloading of the first part and the loading of the next part. The second part can be loaded immediately and the functions of the machine repeated as outlined above.

This is only one of the unusual operations that are being performed on equipment designed and built by Kingsbury Machine Tool Corporation. The drilling and other units can be synchronized and the indexing controlled pneumatically as in this case, and in other machines electrical synchronization and interlocking is employed.



This machine is unusual in that a plurality of operations are performed progressively on one hole and all operations are duplicated six times 60° apart. During one full automatic machine cycle the work is indexed eight times, 60° at a time, during which period, each drilling unit is tripped but six times. The units are tripped progressively as required through valves controlled by a cam shaft geared to the turret.

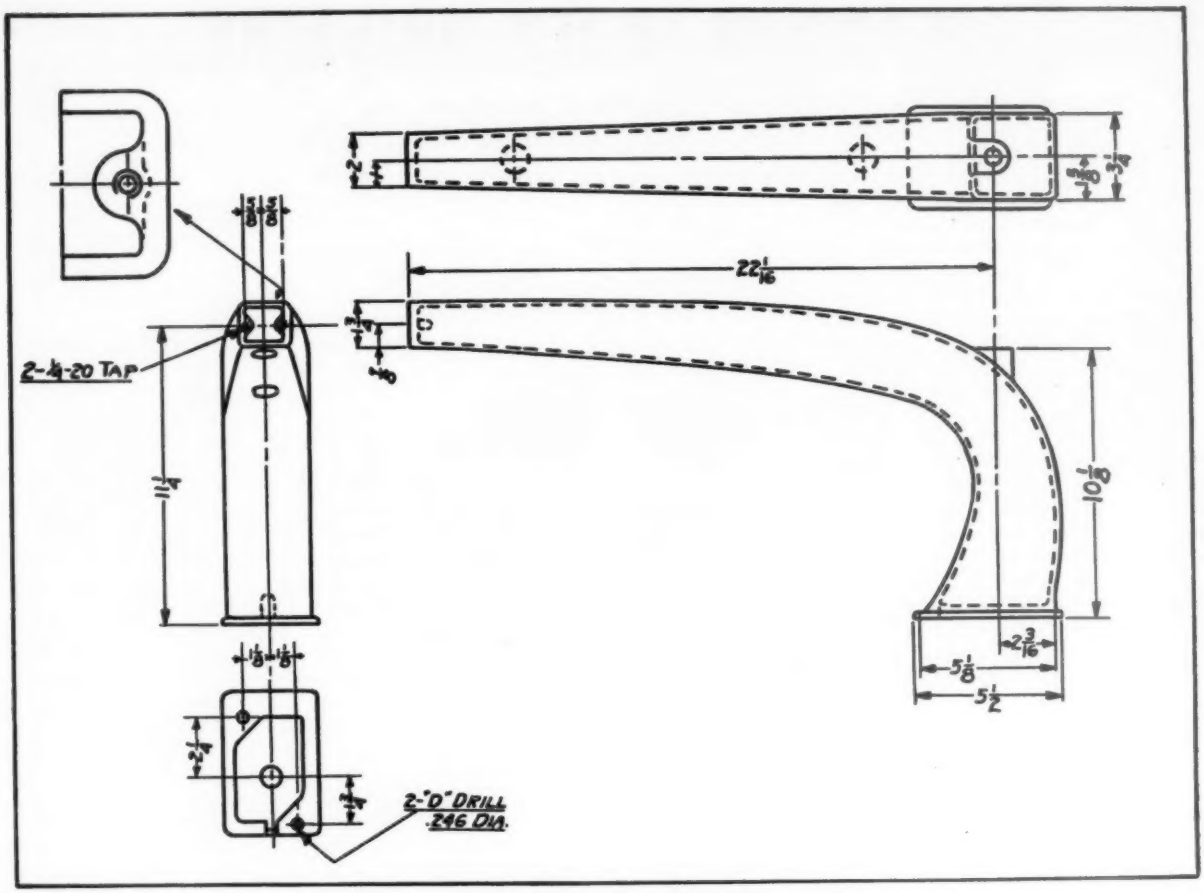


Figure 1. A good example of an awkward piece to work.

ECONOMICAL METHODS OF DRILLING WORK OF AWKWARD SHAPE

By Martin Heinrich
MACHINE SHOP SUPERINTENDENT
Delta Manufacturing Company

IT FREQUENTLY HAPPENS that the tool designer is faced with the problem of drilling, or drilling and tapping, holes in castings and other machine parts that are awkward to handle by ordinary methods because of their shape or size.

The ordinary procedure, of course, is to design a box jig or index fixture. But a box jig for handling many parts of the type under consideration would be very large and heavy. This in itself slows up production, and if the jig is of the roll-over type its size and weight slow up production still more. In addition to these drawbacks, such a jig or fixture must necessarily be used on a fairly large machine in order to get sufficient room under the spindle. This means tying up a large drill press that might be more profitably used on other work, and it has the additional disadvantage that since large machines have comparatively slow drilling speeds, the rate of production is slowed down again, as the actual sizes of the holes to be drilled might not require such slow speeds.

A piece of work of this type is shown in the drawing accompanying this article. (Fig. 1). It will be

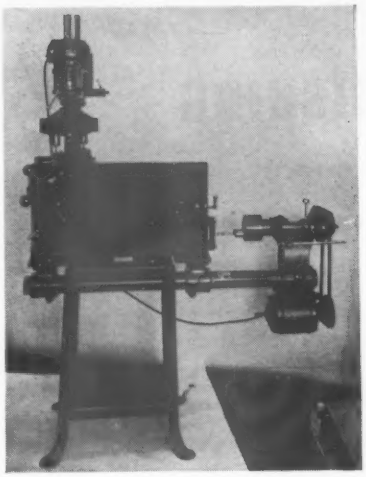


Figure 2. Simple arrangement to drill four holes by means of two self-contained drill heads.

noticed that two holes are to be drilled and tapped to ¼"-20 in one end of the casting, and two other holes .246" diameter to be drilled in the other end, at right angles to the first two. The casting is 11" by 24½" overall, and weighs 20 lbs., so obviously a turn-over jig for handling this piece would be very heavy and slow to handle.

Fig 2 shows a very simple arrangement to drill the four holes by means of two self-contained drill heads, such as manufactured by the Delta Manufacturing Company. These drill heads are economical, self-contained, are accurate and sensitive and require no lubrication over exceptionally long periods, as they are equipped with self-sealed ball bearings.

Simple multiple drill heads are attached directly to the quills, and the operator can drill all four holes simultaneously. The fixture has conventional locating and clamping means for holding the casting and, since only the casting itself must be handled, the rate of production is extremely high in comparison with ordinary methods.

Another 14" sensitive drill press is set alongside the drilling machine, and fitted with a simple locating fixture for the casting. The two ¼"-20 holes are tapped on this machine as shown in Fig. 3.

In addition to the obvious gain in production by the use of this method, there is another gain that should be pointed out. When the milling-machine operator removes a piece from the milling fixture, he loads it directly into the drilling fixture. He then loads a new piece of work into the milling machine, starts the cut, then while the milling machine is operating, he drills the four holes in the first piece. By the time these are drilled, the first milling cut has been made, the fixture is indexed to the second position and the second milling cut started. The operator then transfers the first piece to the tapping machine and taps the ¼"-20 holes in the end. It will be seen that the drilling and tapping operations are done during the time that the milling-machine operator would otherwise be idle.

To summarize the advantages of this method of drilling and tapping such awkward pieces in this manner:

1. The operator handles only the castings. No parts of the jig need be handled, lifted, tumbled or indexed.

2. The drilling fixture is always set up, thus eliminating setup expense for each lot of castings. The entire fixture, including the drilling heads, usually costs less than a conventional jig for the same operation, and it can be stored between lots as easily as a jig.

3. The machine is a self-contained production unit, and releases for other uses the large drill press that would be necessary for the conventional jig.

4. The drill heads may be used on other drilling fixtures while the fixture on which they are normally used is not in operation.

5. If the parts become obsolete the stand, columns on which the drill heads are mounted, and the drill heads themselves may be used for other fixtures. Only a few parts of the fixture itself need be scrapped. On the conventional type of jig there is very little salvage when the parts for which it is designed become obsolete.

6. Since the drill heads used on these fixtures require only from 1/3 to ½ H.P., there are decided savings in power and upkeep expense, in addition to the other economies.

7. The machine is self-contained, and can be placed alongside another machine, such as a milling machine, so that the milling-machine operator can operate the drilling machine during the cutting period of the milling cycle. Labor cost on many operations can thus be eliminated.

Another example of the last-mentioned point is the case of a steel bench-lathe bed that has a slot milled in its entire length. The burr formed on the underside of the bed by the milling operation was formerly removed by hand—a slow operation. Now, a drill press of the type shown in Fig. 3 is set up alongside the milling machine. The drill-press head is reversed so that the spindle projects upward through the hole in the center of the table, the latter being used above the head. An ordinary Woodruff cutter is held in the chuck of the drill press, and is set above the surface of the table at a distance equal to the thickness of the lathe-bed stock.

While the slot in one bed is being milled, the operator takes the bed previously slotted, sets it upside down on the drill-press table with the slot opposite the cutter shank, then pulls the bed across the cutter. The slot in the bed spans the shank, and the cutter cleans the burr from both sides of the slot, thus eliminating the hand operation. Since the second operation is done during the milling-machine cut, there is no additional labor cost.

Figure 3. The 14" sensitive drill press, used in two novel methods described in this article.

THE HONING PROCESS
for CYLINDRICAL BORE FINISHING

By J. E. Andress
PRESIDENT
Barnes Drill Company

AUTOMOTIVE engineers have long since recognized Honing as the last word in accuracy and smoothness of final cylinder finish for efficiency, economy and durability of the motors.

Honing is the operation of final sizing and finishing the interior of cylinder bores, using expanding hones provided with abrasive stones of suitable grit and grade. Honing is accomplished by simultaneous rotations and reciprocations of the hone within the bore to be finished.

There Is No Substitute for Honing

Experience proves the caption statement, for any shearing cut such as reaming or fine boring raises the molecules of metal so that under magnification the effect is that of file teeth.

Internal honing, because of long abrasive stones, self-compensating in the honing tool, quickly smooths down these sharp points to a solid base metal surface, far smoother than by any other process and uniform for roundness, straightness, and elimination of taper.

The established fact that The Honing Process, properly carried out, provides much greater accuracy, higher production, and finer finish than can be attained by any other known process, indicates the necessity for the correct type of honing machine, as well as honing tools.

Early in the year 1925, Barnes Drill Co. of Rockford, Illinois, undertook the development of high grade Honing Machines, and these, in a wide range of sizes, have become known throughout the world as Self-Oiling Hydraulic Internal Honing Machines.

The same machines may also be used for external honing, provided a suitable tool is available. Eleven sizes of Hydraulic Honers, including vertical and horizontal, give this company the largest line of Hydraulically Operated Honing Machines in the world.

Work Adaptable to Honing

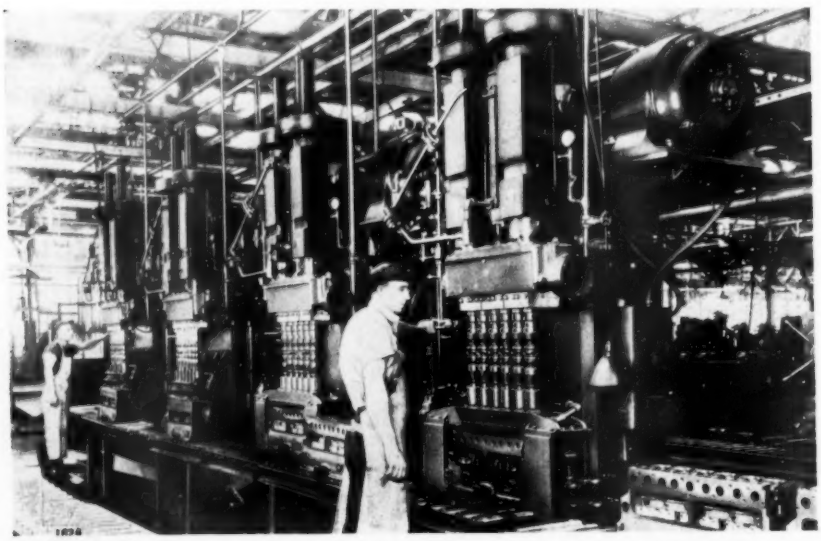
Besides the automobile cylinders, it has been found that many other classes of work may be economically honed for the superiority of cylinder finish. For instance, cylinders for internal combustion engines of every size and purpose, including Diesel and aeroplane engines, compressors, hydraulic machinery, ordnance parts, such as recoil and recuperator cylinders and gun bores, pumps, steam engines, pneumatic equipment, connecting rod bores, piston pin holes, cylinder liners, tractor motor sleeves, bushings, gear bores, and many machine tool parts, including spindle sleeve bearings, bushings, and the like, refrigerator compressor cylinders—and many other classes of work in all diameters from ½" (the smallest hone that can be secured) on up to the very largest diameters of 20 to 30"—and in connection with horizontal honing machines, of any length desired.

Preparation

Internal honing is an extremely accurate finishing process producing a high degree of smoothness and creating the final size of the bore by removing the microscopic ridges and irregularities left by reaming, boring or other preparatory operations and bringing the whole surface down to the "base" metal. Honing removes high spots, corrects out-of-roundness and taper but it does not establish the position or alignment of the hole or bore. The amount of metal removed is relatively small and in large or heavy jobs the hone must "float," or move slightly with reference to its driver, so that it follows the previously machined bore. In honing many kinds of small parts to meticulous accuracy, such as connecting rods, working in tenths, the hone is rigidly guided in a vertical plane and the work-piece is allowed to float. In either arrangement, holes to be honed must first be fine bored or reamed in correct axial alignment. The quality of surface produced by the preparatory operation does not affect the smooth uniform finish created by the honing process, but a good boring or reaming job does shorten the time required for honing and makes the process most economical. The reaming or fine boring operation should leave just enough metal to be removed by honing so that all tool marks will be removed and the perfectly smooth uniform fine finish of the honing process secured.

Metals and Holes Honed

While cast-iron of any hardness may be honed readily, the process



A typical production line of multiple honers on "mirror-smooth" cylinder finishing.

also is completely successful in steel of various qualities and heat treatments. Certain non-ferrous metals can be honed provided that their structure is such that the metal removed by honing does not clog the stones. The surface honed may be interrupted by ports, key-ways, or other openings; so long as these are bridged by the stones, without interfering in any way with the accuracy or quality of finish.

There are many different kinds, types, and sizes of hones for all sorts of bores including cylinders having a closed or "blind" end. The type of hone selected for each piece of work is a matter of great importance on which expert advice should be secured.

Honing Angle of Cross-Hatch

Internal honing is accomplished by simultaneous rotation and hydraulic reciprocation of the honing tool in the cylinder or bore. The stroke must be smooth, uniform and free from shock, with exact control of over-run. The angle of the helix followed by the hone in its movement has an important bearing upon the success of the honing operation and the accuracy of the work produced. Generally speaking the included angle between the helix of strokes made in opposite directions should lie somewhere between 40 and 60 degrees. The exact relationship between rotation and reciprocation necessary to create the most effective "cross-hatch" can always be established readily on Barnes Hydraulic Honing Machines.

In Self-Oiling Hydraulic Internal Honers a uniform rotary spindle-speed is provided through pick-off gears on some machines, through a quick-change gear box on others. The reciprocating movement of the hone must be uniform and reversals must take place quickly without shock. Hydraulic power, as applied in Barnes Internal Honing Machines, meets these requirements perfectly and in addition has the inherent advantage of being adjustable to any desired rate of reciprocation, and stroke length, below the maximum for which the machine is designed. Multiple bores can be honed singly, progressively by indexing from one bore to the next, or simultaneously in any number up to eight.

Hydraulic Dwell

The limited amount of over-travel available in many "blind" holes, or cylinders having closed ends, makes it necessary to control the termination of the downward honing stroke very accurately and to permit the hone to make a few revolutions in the extreme downward position before the upward stroke begins. This is accomplished by a Positive Depth Stop and Hydraulic Dwell mechanism.

Strokes and Cycles

The term "stroke" means one movement of the hone from top to bottom, or vice versa, in the bore being honed. The work stroke must include a small amount of over-travel at each end in order to make enough revolutions to assure straight round parallel walls without bell-mouth. This is an important factor in successful honing and one of many subjects on which the Honing Machine Manufacturers are glad to give interested executives the benefit of their experience.

Stroke-Counting

For mass production, Self-Oiling Hydraulic Honing Machines can be equipped with patented Automatic Electric Stroke-Counter. This device can be adjusted to cause automatic hones to withdraw from the work and stop, after any predetermined number of cycles. Use of the Automatic Stroke-Counter will increase honing production on many kinds of work in which the tolerances on the preparatory reaming or boring operations are maintained uniformly.

Accuracy

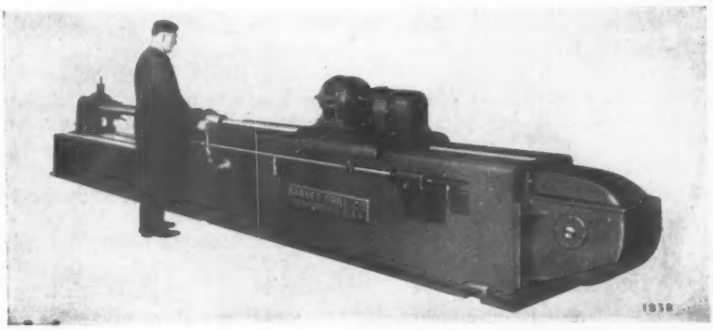
The normal operation of Self-Oiling Hydraulic Honers on a high-production basis finishes small sized cylinders within limits as close as plus or minus .0002" and in some cases .0001". On medium and large size cylinders limits of plus or minus .0005" can be maintained. The honing stones have a relatively long bearing in the cylinder being finished and they actually remove metal by cutting while the hone simultaneously rotates and reciprocates. The pressure applied to the honing stones is distributed over a relatively large area. The hone, therefore, reduces progressively the very fine ridges left by the preliminary machining operation and cuts through any small hard spots which may have sprung away from the reamer or boring tool. While the honing stones slightly overrun the cylinder being finished, it should be noted that much

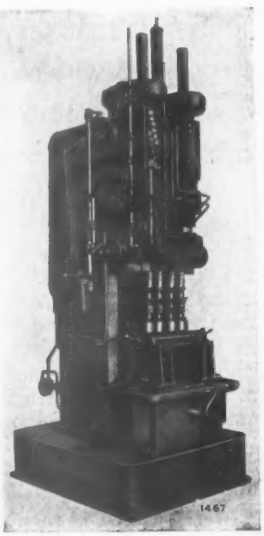
(Continued on Page 26)

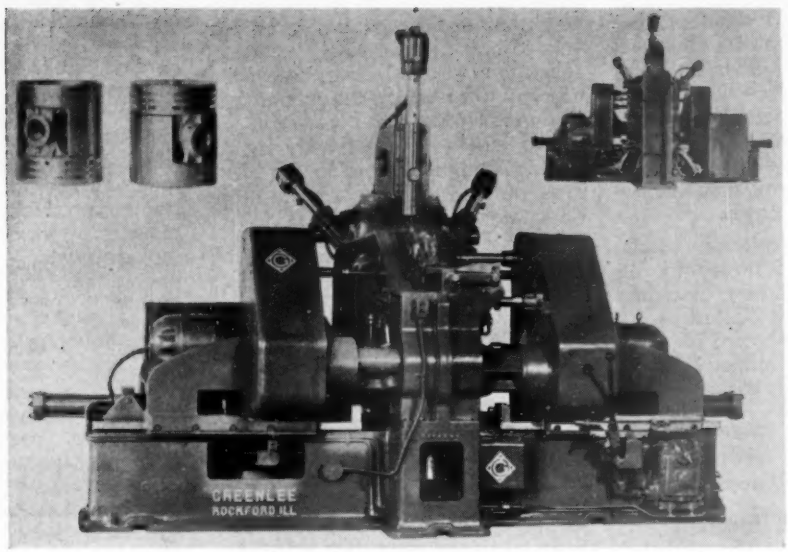
Below: Horizontal honer, for honing work too long to handle vertically.

Right: Vertical honer, especially suitable for the honing of connecting rods and similar work.

Extreme right: Vertical honer for honing two to eight cylinders simultaneously.







THE "RUBE GOLDBERG"

THE NOMENCLATURE OF MACHINERY

IT WAS DURING the presentation of a special machine that the customer stopped me in the middle of the description of an important feature with the query, "Did Mr. Rube Goldberg design this machine?" An axiom in common with Mr. John Wanamaker that "the customer is always right," supplemented with one from Sir Harry Lauder "if it doesn't cost anything," prompted me to answer in the affirmative, and to add, "Rube is a very original and expensive designer."

By J. M. Macrae
Member A.S.T.E.
Greenlee Brothers & Company

Strange as it may sound we were told to proceed with the building of the "Rube Goldberg." After the machine was put into operation we read with interest a description of it in the American Machinist with a photo and caption stating that the mechanics referred to this machine as the "Rube Goldberg." I have watched this machine in operation and the movements of the operator interest me more than the machine, for he is timed to a clock like precision and reminds one of an electric sign doing the same thing over and over again. He starts with unclamping a fixture containing two pistons, removes one completed piston from position "B," transfers the second piston from position "A" to "B" and loads a new piston at position "A," clamps the fixture indexing the turret and presses a button which starts the cycle all over again. These motions are performed at fifteen second intervals or during the time the machine performs the following operations:

(1)—Drills the wrist pin holes

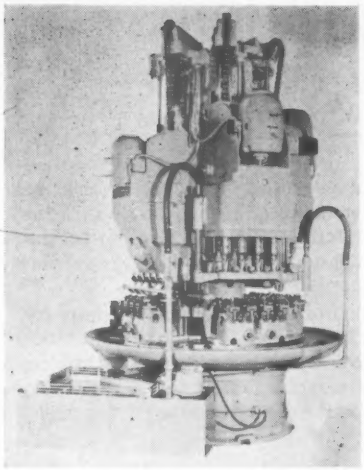
(2)—Recesses a groove in the wrist pin holes

(3)—Drills a $\frac{5}{16}$" dia. hole in the skirt

(4)—Saws two $\frac{3}{64}$" slots on both sides of piston

(5)—Drills four $\frac{1}{8}$" angular oil holes

(6)—Saws $\frac{3}{64}$" angular slot on skirt



THIS IS "THE QUEEN MARY"

At another automobile plant we called on the Master Mechanic for a pass to see one of our machines which had been recently put into operation. The M. M. called in one of his aides. "Take these gentlemen down to see the Queen Mary." On the way down we questioned our guide and learned that the "Queen Mary" referred to our machine and that the name was selected on account of its size, also because "it came across the first time." We watched it operate and here, again, the movements of the operator were more interesting to me than the machine itself. I noticed that everyone who addressed the operator called him "Admiral." Our guide again explained that the "Admiral" is so named because he has command of the "Queen Mary" and also because he operates the fixtures by means of a large wheel resembling very much the steering wheel of a ship, but the "Admiral" did not appear to be enjoying his position of honor and later with careless selection of words told us what he thought of his job. The result of this little talk introduced what he now calls his radio equipment; for myself this is going too far but the Admiral now will have his little jokes as he feels much better clamping and unclamping his fixtures electrically without the aid of the large steering wheel. The motions he goes through now have no appearance of speed or effort but seem to be a part of the general mechanism of the machine, and as we look at him we see that the Admiral of the Queen Mary is more than an operator; he is in charge of a small machine shop, for starting with a rough Connecting Rod forging he performs all of the following operations in about thirty-six seconds:

(1)—Drill the wrist pin hole

(2)—Ream the wrist pin hole

(3)—Elongate the crank hole

(4)—Mill the sides of the rod

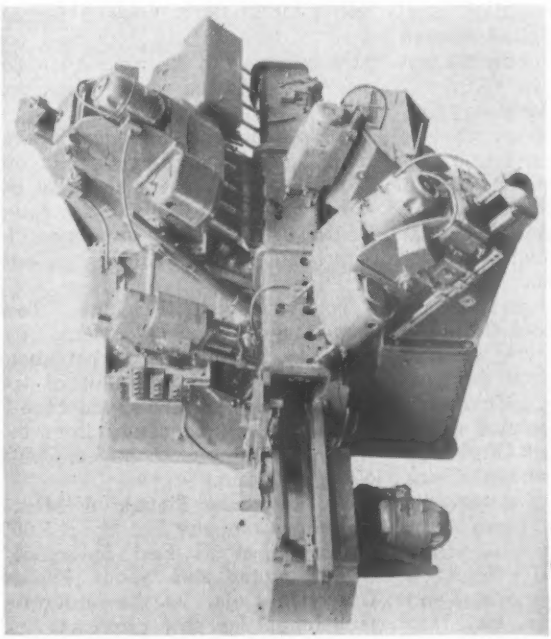
(5)—Mill the bolt bosses

(6)—Mill off the conrod caps

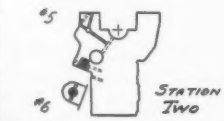
The Rube Goldberg, you will remember, called for the operator's full time and his movements were as constant and precise as those of the machine itself. Then came the Queen Mary whose Radio Control allowed the Admiral to leisurely pilot his command, maintaining, the meanwhile, a weather eye for brewing squalls. Following this trend toward more freedom for the operator, we now move into another automobile plant and present the "Hay Baler." This machine takes the Cylinder Block from the conveyor, locates it and clamps it, moves it along to two other successive positions and at each position performs drilling and tapping operations at various odd angles and then pushes the Block onto the conveyor at the opposite end. This entire movement from conveyor to conveyor is fully automatic and the operator—pardon me—the Overseer has only to watch it operate. I suppose he is the fellow who christened the Hay Baler because the work disappears into the tunnel and we see nothing more of the Block until it is pushed out the other end, the action being similar to that of the Hay Baler on the Overseer's farm.

The names given to machinery such as "Rube Goldberg," "Queen Mary" and "Hay Baler" on account of some trick of ingenious mechanism, or on account of its size or appearance, of course has no bearing on its real value, for no matter how clever the design of the fixture or the machine may be, to produce parts at a profit the machine must be able to stand up against some very severe tests beyond the usual labor cost per piece. Machines that show a large saving in labor cost by performing a variety of operations often run expense accounts in other departments that if charged against the machine would change the cost figures materially. Thus many innocent machines are made to stand up under loads produced by their offending brothers, but we sometimes find that even if all the expense items were charged to a special machine it would still show a profit beyond any other method and that is one reason why special machine building is so interesting.

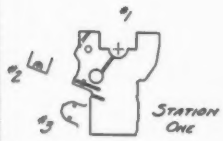
THE "HAY BALER"



#7 (3)-1/8" PIPE TAPS
#8-1-5/16-18 TAP
1/4" STRAIGHT PIPE TAP
#9-2-5/16-18 TAPS IN DISTRIBUTOR BOSS



#4-1-1 1/2" DRILL FOR OIL PUMP
#5-5-5(.348) DRILLS
#6-SEMI-FINISH REAM, COUNTERBORE & CHAMFER DISTRIBUTOR HOLE



#1-5-5/16" DRILLS
1-3/8" DRILL FOR OIL GAUGE
#2-1-G(.261) DRILL REQ. 5/16-18 TAP
1-5/16" DRILL FOR 1/4" STRAIGHT PIPE TAP
#3-2-G(.261) DRILLS FOR 5/16-18 TAP

PRODUCTION PERSPECTIVES

News of Mass Manufacturing from Everywhere

Disturbance of Connecticut's industrial structure by **intensive union organization activity,** with its complement of scattered strikes and threats of more in the future, is **balanced** on the other side of the ledger **by the most widespread plant expansion program in the state's history,** further wage increases and a steady flow of new business. Mass production plants as well as smaller industrial units are undergoing heavy labor union fire, with organization started at **Landers, Frary & Clark,** New Britain; **New Haven Clock Co.,** New Haven, and a number of other large factories which hitherto have been "open shop" bulwarks. A **CIO strike** at **Casco Mfg. Co.,** Bridgeport, was **settled in early May.** . . . On the plant expansion side, **General Electric led** the latest group joining the list with plans **for modernization** of its power house **at a cost of $1,000,000,** as well as more plant additions costing $33,000. . . . **Pitney-Bowes Postage Meter Co.,** Stamford, will spend more than $100,000 on a new factory building. . . . **American Brass Co.,** Waterbury, has started work on a new $50,000 building at its North Branch plant, while **Scovill Mfg. Co.** is erecting a new building to cost $26,000. . . . **Cushman Chuck Co.,** Hartford, and **Cuno Engineering Corp.,** Meriden, plan large additions. . . . **United Aircraft Corp.,** East Hartford, will erect a test house building. . . . S. O. & C. Branch, **United Shoe Machinery Co.,** Ansonia, is remodeling an existing building for conversion into a machine shop. . . . New construction has been started by **Humason Mfg. Co.,** Forestville; **Hershey Metal Products Co.,** Derby, while **Trumbull Electric Mfg. Co.,** Plainville, **has leased** 14,000 square feet of space in the **Tobrin Tool Co. plant** for expansion use. . . . More than $1,500,000 is involved in the programs listed above. . . . **Charles B. Simmons** has been **appointed works manager of** the **Sessions Clock** Co., Forestville. . . . **Independent Clock Co.,** New Britain, is soon to move its plant to Manchester, Conn. . . . **Peck, Stowe & Wilcox** Co., Southington, has gone into production with a new line of roller skates and **Segal Lock & Hardware, Inc.,** Norwalk, is **tooling up for a new type of electric shaver. . . . Waterbury Tool Co.,** Waterbury, has been awarded a federal government contract for hydraulic drives in the amount of $310,466.18, bringing the concern under the Walsh-Healy Act. . . . **Reports** from leading tool manufacturers in Massachusetts, Vermont, and New Hampshire, **tell of a well-sustained flow of orders with a backlog** that will keep plants operating at full capacity through the present quarter at least. Demand for machine tools and other lines of producers' goods has held strong, but a slight falling off is reported in the sale of small tools for individual mechanics' use, this decline being viewed as largely of a seasonable nature. Such concerns as the **Greenfield,** (Mass.) **Tap & Die Corporation, Van Norman Machine Tool Company** of Springfield (Mass.); **Jones and Lamson Machine Company and Fellowes Gear Shaper Company** of Springfield (Vt.); **Brown & Sharpe Manufacturing Company** of Providence (R. I.) are reported operating at a very high level.

Smith & Wesson of Springfield (Mass.) is recalling a considerable number of former employes. **Men as old as 70 years of age have been called back in recent months** as a result of an expansion in the demand for Smith & Wesson revolvers. Approximately 150 men are now engaged in the production departments, representing a marked increase over past years.

Orders booked and **plant operations** have been carried on to the **highest point in several years by the L. S. Starrett Company** of Athol (Mass.) as a result of industry-wide improvement in machine tool and small tool lines.

Porter-McLeod Machine Tool Company of Hatfield (Mass.) expects **to put on the market about June 1 a redesigned unit** of the **cold-cut circular sawing machine** it has taken over recently from the Higley Machine Company of South Norwalk (Conn.)

Westinghouse Electric & Manufacturing Company has about **5,000 employed at its East Springfield (Mass.) works and about 650 in Chicopee Falls.** In the larger establishment fan production has had a seasonal rise, while refrigeration remains at a high point and the air-conditioning division is running at capacity. Expansion of the plant is contemplated.

Indian Motocycle Company of Springfield (Mass.) is **continuing to operate** its equipment **at full capacity,** with more than 400 employed, continuing the rate of the last four months.

Largely on the strength attained by the washing machine industry this season, **Perkins Machine & Gear Company** of Springfield (Mass.) has improved its production and **National Equipment Company of Springfield** has come up on the strength of an **improved demand for candy machinery.**

The **Greenfield** (Mass.) **Tap & Die Corp.,** aided by introduction of new lines and operation of a new plant at Detroit, is **making** an **especially good showing.** Most of its departments are **running two shifts,** and **some** are **running three.** Number of persons employed, more than 1,200, is the largest since 1920.

Most Detroit plants continue at high production levels. As this page goes to press the C.I.O. begins its concerted effort to unionize the vast Ford Motor Company plant. No one can guess at this time the outcome of this move.

A recent meeting of the share holders of the **Ex-Cell-O** Aircraft & Tool Corporation elected to amend the articles of incorporation, **changing** the **corporate name** to **Ex-Cell-O Corporation. Ray M. Hirst,** employed at the Dodge Motor main plant, **has been promoted** to the position of **Mechanical Engineer** of the **new transmission plant at Kokomo,** Indiana, where production of sixty-five transmissions per hour has been scheduled. **J. C. Austerberry Sons have moved** from their location at 684 West Congress Street **to 332 Curtis Building,** Hamilton Avenue at West Grand Blvd., Detroit, Michigan. **L. B. Alliason,** for many years identified with transmission gear manufacturing and as engineering representative, **has joined the staff of National Broach** and Machine Company. He was formerly with the Ford Motor Company and the Gear Shaper Company.

JUNE CHAPTER MEETINGS

Chapter Meeting Announcements must be received on or before the 20th of preceding month. Omissions are the result of not receiving this information by this date—in time for publication.

BRIDGEPORT

June 10, 1937, at Club House at Crescent Avenue and Willard Street sponsored by Foremans Club of Bridgeport Brass Company.

SUBJECT: "Development of Dies" with General Discussion.

BUFFALO

Buffalo Chapter's next meeting will be held June 11 at the Buffalo Trap & Field Club.

DINNER will be served at 7:00 o'clock and an interesting program is being planned for the meeting following the dinner. Make reservations with B. C. Buerk, Buffalo Chapter Secretary, 315 Grote Street, telephone Delaware 6100.

CHICAGO

June 14th, 1937—Machinery Club, 571 W. Washington Blvd. Dinner 6:30 P.M.—Technical Session 8:00 P. M.

SPEAKER: Mr. Philip M. McKenna, Vice President of the Vanadium-Alloys Steel Company, Latrobe, Pa.

SUBJECT: Cemented Carbides—illustrated with slides.

This should be of particular interest to all our members because the art is still young and many shops are just now getting into the use of carbide tipped tools. There will be photographic slides illustrating several interesting jobs done with carbide tools, including a series showing the brazing and grinding of cemented carbide tools from blank tips and steel shanks.

Mr. McKenna's thorough knowledge of this subject will make both an interesting and instructive talk and all members will profit by attending.

CLEVELAND

June 15, 1937—Last meeting until September. Arrange to be present. Dinner 6:30 P.M.—$1.00 per plate. The Colonial Hotel, 523 Prospect Ave., 8:00 P.M.

Mr. D. L. Cowles, ballistic expert of the Cleveland Police Department will talk on "The Tool Designer's Assistance in the Detection of Crime."

In fairness to our Secretary, C. V. Briner, c/o Pratt and Whitney Co., 1433 East 12th St., make his work lighter by advising him early, of your intention to attend.

DETROIT

The regular June meeting of the Detroit Chapter of the A.S.T.E. will be held June 10, 1937, at the U. S. Rubber Products Co. Plant, 6600 E. Jefferson Ave.

DINNER served promptly at 6:30 P.M. in the plant dining room. $1.00 per plate.

A talk will be given by MR. MONTAGUE A. CLARK, Manager of Industrial Relations for the company, on the topic "FROM THE TREE TO THE TIRE" after which a trip will be taken through the plant.

This trip should be of great interest to all members. A large attendance is expected, so make your reservations early by calling A.S.T.E. office MA 0649.

MILWAUKEE

June 10, 1937—Dinner, 6:30 P.M.—$1.00 per plate—Colonial Room Republican Hotel.

A representative engineer of Colonial Broach Co., Detroit, Michigan, will discuss "Broaches and Broaching Problems."

Mr. John Tompak, Badger Tool & Die Corp., will conduct blackboard discussion.

PITTSBURGH

June 11th, 1937—Dinner: 6:30 P.M.—Meeting: 8:00 P.M. Penn-McKee Hotel, McKeesport, Pennsylvania.

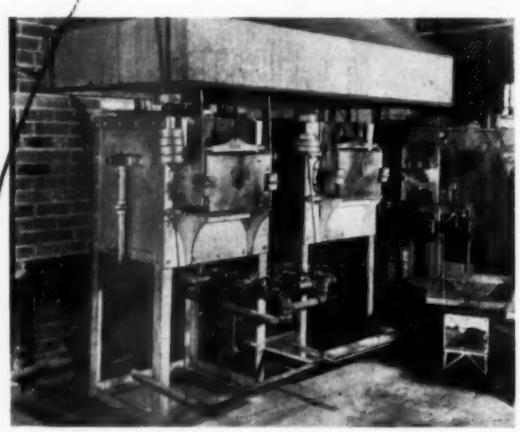
SPEAKER: Malcolm F. Judkins, Firth-Sterling Steel Company.

SUBJECT: "Description of Production Processes in the Making of Firthite Sintered Carbide Tools."

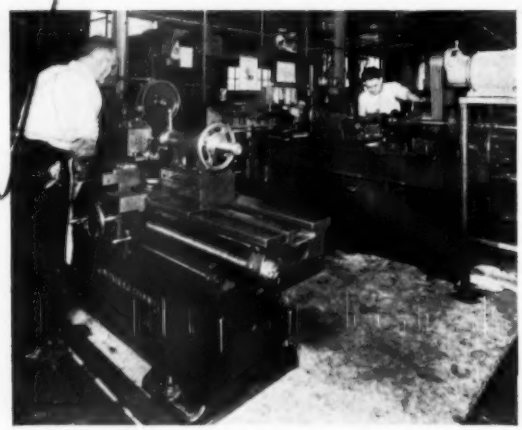
Members to be guests of the Firth-Sterling Steel Company, McKeesport, Pa. Meeting to be followed by a conducted tour of the newly opened Firthite and Firthaloy Building at the Firth-Sterling Steel Company's plant which is devoted entirely to the manufacture of Firthite Tools and Firthaloy Dies.

Reservations: Please make dinner reservations before noon Friday, June 11th. Call Miss Davenport, Valley 511 or Brandywine 1490.

THIS MONTH'S COVER



Brazing Furnaces for Cemented Carbide Tools.



A Section of the Form Relieving Department.

Part of Milling Machine Line for Special Tools

THE MORSE TOOL COMPANY

It has always been an accepted fact that the life blood of production is tools. The special cutting tool has become increasingly important during the last decade due to the increased efficiency of the Machine Tool and to the many improvements in metals.

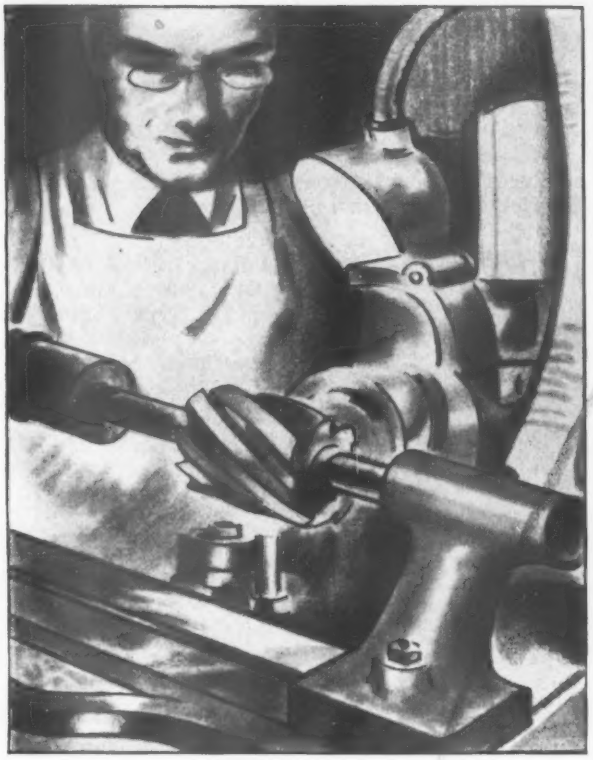
The Morse Tool Company was first conceived and entered into the production of special cutting tools in 1921. The company has grown and expanded under the able leadership of its founder and president Wm. S. (Bill) Morse and in 1935 the company moved into the modern and efficient plant that is shown on this month's cover.

Counterbores made with the patented Morse hexagon drive were the main product of the company during the early days of the organization, however, due to an insistent customer demand special tooling became a more important factor until today the company is recognized as one of the leading cutting tool concerns in the country.

In 1934 the company entered into the making of Tungsten and Tantalum carbide cutting tools and in the short space of two years have gained an enviable reputation for the design and manufacture of this type of tool. The brazing process on these tools is done in furnaces of the Morse Tool Company's own design and development producing a bond of maximum strength between the tip and the shank proper of the tool.

In 1936 an addition to the plant was necessary in order to accommodate the greatly increased business and this was erected in the latter part of the year.

The company maintains a complete designing and engineering service for their customers and are well prepared to assist in tooling problems.



In Cutters or Camera Lenses

ACCURATE GRINDING ASSURES

THERE IS A DIFFERENCE

• There's a world of difference between the portrait camera and the inexpensive "box" you buy in the corner drugstore. Much of the difference lies in the way the lens is ground. • Accurate grinding that assures correct lead and pitch, proper web thickness and shearing angle is only one of the extra values that have built a world-famous reputation behind the name of Morse. Step-by-step inspection, carefully-controlled heat-treating — each plays its part, as do Morse's years of tool making experience. • Try a Morse Tool next time you face a "tough" drilling, reaming, threading or milling job, and you'll prove to yourself "There Is A Difference". You'll give up the idea that all brands are alike when you see the fast, clean work Morse Tools turn out, whether the work is routine or highly specialized. *A conveniently located Morse Distributor will give you prompt service.*

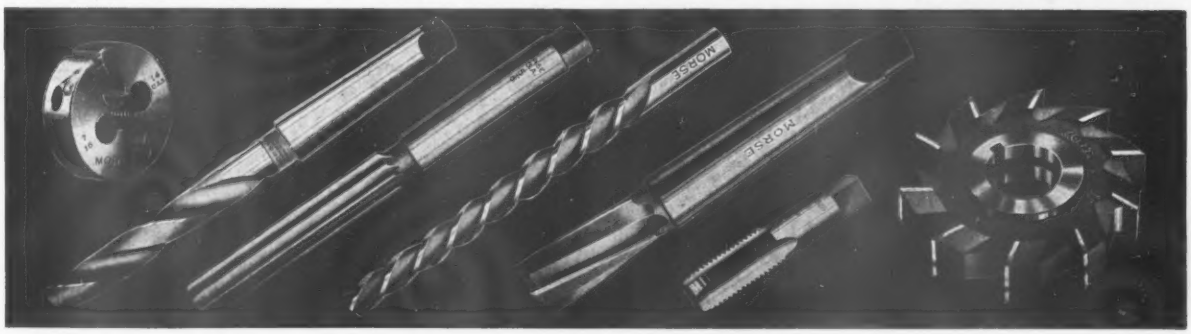
MORSE

TWIST DRILL AND MACHINE CO., NEW BEDFORD, MASS., U. S. A.

New York Store
130 LAFAYETTE ST.

Chicago Store
570 WEST RANDOLPH ST.

THE MORSE LINE INCLUDES HIGH SPEED AND CARBON DRILLS - REAMERS - CUTTERS - TAPS and DIES - SCREW PLATES - ARBORS - CHUCKS - COUNTERBORES - MANDRELS - TAPER PINS - SOCKETS - SLEEVES



A.S.T.E. CHAPTER NEWS

BUFFALO

Benjamin C. Buerk, Secretary
315 Grote Street, Buffalo, N.Y.

The regular meeting of the Buffalo Chapter of the American Society of Tool Engineers was held in the Fillmore Room of the Hotel Statler. Dinner was served at 7:30 to thirty-six members and friends. At 8:30 a business meeting was held with approximately fifty present, Mr. Don Reep presiding.

Mr. Reep spoke of the benefits of The Society and made some clarifications regarding eligibility for membership. He also spoke of our future plans and appointed the following members to the Nominating Committee to select three men as candidates for Vice-Chairman. C. H. Tauser, Wm. Dworak, Walter Uebelhoer.

Mr. Art Whislter, Chairman of the Membership Committee, announced the following members on his committee: Howard Taylor, Frank Schwenzer, C. M. Fuller, O. A. Donath.

Mr. Bruun, Chairman of the Meeting Committee, appointed Mr. H. O. Donath to his committee. He then introduced Mr. W. H. Hangartner of the Ingersoll Milling Machine Company and Mr. R. B. Hawkins of the Ingersoll Cutter Division. Mr. Hangartner showed us four reels of motion pictures on:

1. Tubular Ways
2. The Johnson Drive
3. The Operation of an Adjustable Rail Planer Type Milling Machine.
4. The operation of a Special Electrically controlled Milling and Boring Machine.

The Meeting adjourned at 10:30 P. M.

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DETROIT

R. M. Smith, Chapter Publicity Chairman
12775 Greenlawn, Detroit, Mich.

The regular meeting of the Detroit Chapter of the A.S.T.E. was held jointly with the American Society of Mechanical Engineers May 18, 1937, at the Statler Hotel.

Meeting called to order 8:10 P. M. by the A.S.M.E. President, James H. Herron, who after a few words of welcome turned the meeting over to the Vice-Chairman, William L. Batt, Past President A.S.M.E. He then welcomed the members of the A.S.T.E. and elaborated briefly on its character and purposes, etc. for the benefit of the A.S.M.E. members.

Mr. C. F. Kettering, Vice-President of General Motors Corporation, was then introduced as the substitute speaker for Mr. M. S. Knudsen, President G. M. Corp. Mr. Kettering gave a very interesting talk on research problems, injecting at various points lively humor pertaining to engineering and manufacturing problems.

Mr. F. W. Cederleaf, Manager—Machinery Division, Ex-Cell-O Corporation, was the second and last speaker of the evening. He read a paper on "Machine—Tool Builders Contributions to Mass Production of Automobiles," which covered Boring Equipment and Tools such as used ten years ago, comparisons with present equipment and tools, and the advantages derived by present methods.

After Mr. Cederleaf's talk the Chairman declared the meeting open for general discusion which did not materialize, hence it adjourned 10:20 P.M. after the an-

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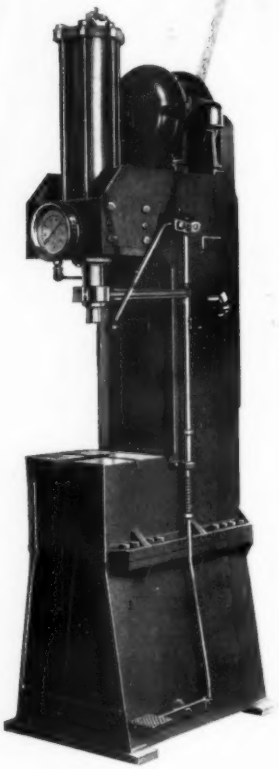
"LOGAN"
HYDRAULIC PRESSES

"LOGAN" Saves
TIME
EFFORT
MOTION



"LOGAN" Hydraulic forcing presses, of standard design, are made in sizes of from one to fifty ton capacity. From one to five tons, press is furnished for bench mounting or with a sub base. From five to fifty tons the base is an integral part of the press frame.

Many special "LOGAN" Hydraulic presses, have been engineered and built for our customers' special needs. The wide and varied experience of our engineers gained over a long period of years is at your service in solving your press problems. Let us help you save time, effort, and motion.

LOGANSPORT MACHINE INC.,
LOGANSPORT, IND.

ENGINEERED PRODUCTION
EXAMPLES FROM THE SUNDSTRAND FILES
No. 3711
Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

Automatic 8-Spindle Vertical Lathe

Has Hydraulic Chucking and Operating Cycle

Rough turning the outside diameter and crown of the cast-iron piston shown in Figure 1 is simple, rapid and economical on the Sundstrand 8-Spindle Automatic Lathe shown in Figure 2. Machine has heavy cylindrical base on which an octagonal column is rotatably mounted. Each face of the octagonal column carries a Sundstrand Self-Contained Hydraulic Unit which travels vertically in an automatic cycle of rapid approach, feed, and quick return governed by easily adjusted dogs. On the spindle of each Hydraulic Unit is a push-button controlled, hydraulically-operated expanding chuck for holding the work-pieces.

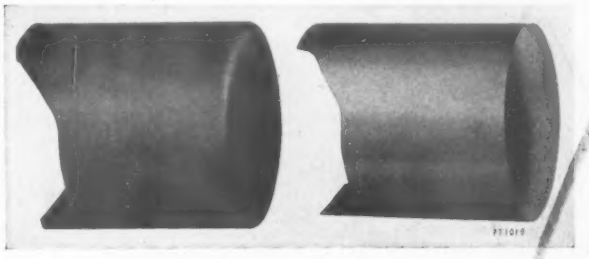


Fig. 1 — Cast-iron pistons before (left) and after turning outside diameter and crown.

As the central column rotates, downward movement of the Hydraulic Units feeds the piston against a stationary mounted tool to turn the outside diameter. A heavy bell crank, pivoted on the side of the Hydraulic Unit, carries the tool which turns the crown of the piston to the correct radius as the Hydraulic Unit moves downward.

Running this machine is simple and easy. Rotation of the column is continuous, starting and stopping of the spindles automatically controlled. Operator merely unloads and loads spindles as they pass. He presses one button to release finished piston, places a rough one on the hydraulic chuck, presses another button to clamp the work.

This machine is a typical example of efficient, highly productive special Sundstrand equipment for solving unusual production problems and reducing costs. When production does not require special machinery, economical solutions to milling and turning problems are provided through skillful application of standard or semi-standard Rigidmils and Stub Lathes. Investigate. Send drawings and data for reliable cost and production estimates.

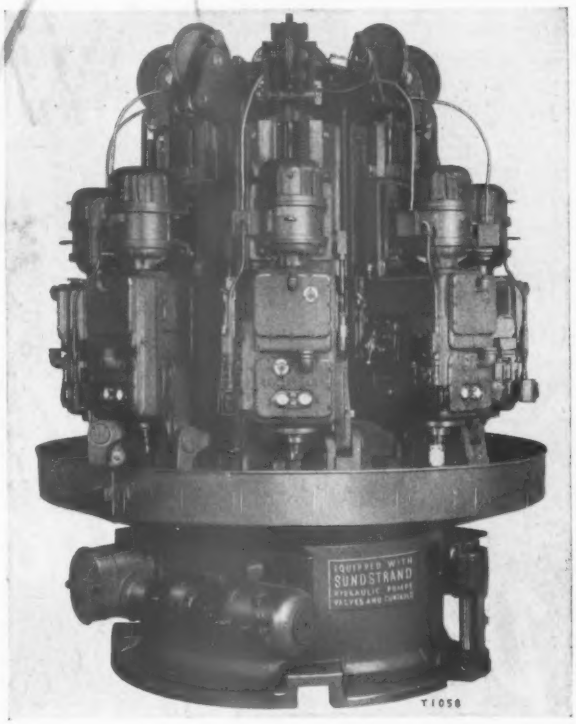


Fig. 2 — Sundstrand 8-Spindle Automatic Lathe for rough turning outside diameter and crown of cast-iron pistons.

SUNDSTRAND MACHINE TOOL CO.
2532 Eleventh Street, ROCKFORD, ILLINOIS, U. S. A.

RIGIDMILS - STUB LATHES
3-Wheel Tool Grinders - Centering Machines
Hydraulic Operating Equipment - Special Machinery

CHAPTER NEWS

(Continued from Page 22)

nouncement that free refreshments would be served in an adjoining room. Many A.S.T.E'rs took advantage.

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MILWAUKEE

E. E. Houston, Chapter Publicity Chairman
1029 So. 35th St., Milwaukee, Wis.

The Milwaukee Chapter A.S.T.E. held its regular dinner meeting on May 13th at the Republican Hotel. A large group attended—140 registering.

At the April meeting one of our "out of town" members, Mr. Gideon Kane, Tool Supervisor, Northwest Engineering Co., of Green Bay, requested Chairman Smart to have a speaker deliver a paper on "Scheduling and Routing of Heavy Machine Parts Through the Manufacturing Process."

Mr. Harold Heywood, Chief Inspector, Kearney Trecker Corp., presented a paper covering this subject, and when we realize the volumes written embracing it, his paper was as complete a synopsis as we have ever had the pleasure to hear.

The speaker declared that a thoroughly workable system is not only highly satisfactory to the management but to labor also. Where the worker has a wage incentive and profit sharing plan he is able to make more money for himself, and thus puts a premium on good workers and better work.

Guest speakers of the evening were Messrs. Bassler and Thomas, of Taylor Winfield Co. Mr. Bassler's talk was illustrated with motion pictures. Since seeing is believing, these gentlemen just about settled the old argument—"Which is Best, a Casting or Welded Construction?" Nevertheless no matter how convincing our speakers were, we would like to hear the question debated: "Be it resolved: That Welded Construction Should Replace Cast Iron in all Instances."

Mr. A. E. Rutzen, Chairman of the dance committee reported that the first annual dance was a success. Mr. Daniel D. Eyster was appointed chairman of the membership committee to facilitate the handling of new memberships.

We have to acknowledge Messrs. W. R. Boulet, Russell Sprithe, Harry Barye, Joseph Sauer and Gideon Kane, for their interest in our meeting. These men traveled from Green Bay to attend.

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PITTSBURGH

J. H. Thomas, Chapter Publicity Chairman
7442 Pennfield Court, Pittsburgh

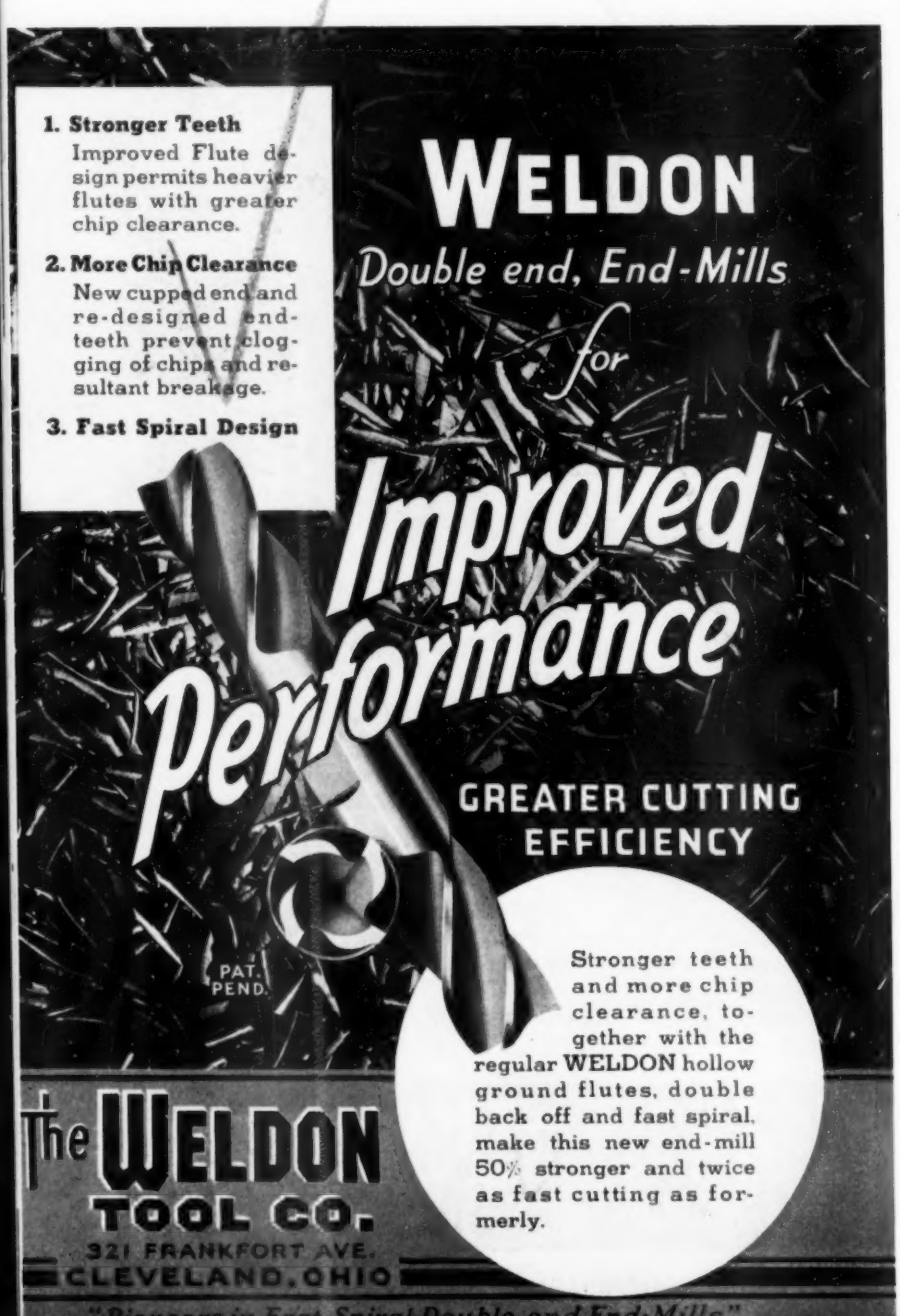
Meeting, May 14, 1937, Fort Pitt Hotel, Pittsburgh, Penna. Attendance, 55. Meeting opened by Chairman J. R. Weaver at 8:00 P.M. The minutes of the previous meeting were not read, since they were published in the May issue of the "Tool Engineer." It was moved, seconded and passed that meetings be suspended during July, August and September.

To those who have made application, but who have not received communication from Detroit, Mr. Weaver stated that he expected to be in Detroit the week of May 17th and that he would discuss these matters with several of the national officers.

Mr. Weaver introduced "Enos—the honest magician," who provided fifteen minutes of entertainment.

Mr. Weaver announced the appointment of Mr. L. D. Rigdon, Westinghouse Electric & Manufacturing Company, as Chairman of the Program Committee in place of Mr. Frank W. Curtis who has moved from this district. Mr. Rig-

(Continued on Page 34)


1. Stronger Teeth
Improved Flute design permits heavier flutes with greater chip clearance.
2. More Chip Clearance
New cupped end and re-designed end-teeth prevent clogging of chips and resultant breakage.
3. Fast Spiral Design
WELDON
Double end, End-Mills
for
Improved Performance
GREATER CUTTING EFFICIENCY
PAT. PEND.
Stronger teeth and more chip clearance, together with the regular WELDON hollow ground flutes, double back off and fast spiral, make this new end-mill 50% stronger and twice as fast cutting as formerly.
The WELDON TOOL CO.
321 FRANKFORT AVE.
CLEVELAND, OHIO
"Pioneers in Fast Spiral Double-end End-Mills"

ANOTHER FIRTHITE INSTALLATION

A 2" RADIATOR NIPPLE COMPLETE EVERY 35 SECONDS

FIRTH-STERLING PRODUCTS

Firthite Sintered Carbide Tools
Firthite Sintered Carbide Blanks
Firthaloy Wire Drawing and Extrusion Dies
Circle © Super High Speed Steel
Blue Chip High Speed Steel
Tungsten Hot-Work Steels
Cromovan Triple Die Steel
Invaro Oil-Hardening Steel
C. Y. W. Choice Hot-Work Steel
Special A. S. V. Steel
J-5 Chisel and Punch Steel
Firth Winged Ingot Steels
Sterling Stainless Steels
Sterling Nirosta Steels
Globe Drawn and Ground Bars, Drill Rod and Wire
Firth-Sterling Special Tool Steel
Tool and Die Steels for Every Purpose

Four **FIRTHITE** tools that chamfer, rough and finish turn cast-iron radiator nipples at a speed of 250 feet per minute with a .024" feed, give a machining time of about 10 seconds and a floor-to-floor time of 35 seconds per finished piece.

Speed and quantity with quality are all realized with **FIRTHITE** tools.

The longer tool life obtained even with increased speeds and feeds makes the initial cost of a **FIRTHITE** tool installation of minor importance.

The indirect savings are the result of the smooth finish produced by **FIRTHITE** making grinding or polishing unnecessary on many operations.

These direct and indirect savings are characteristic of **FIRTHITE** tools and result in profits well worth the consideration of any management.

FIRTH-STERLING STEEL COMPANY

Works: McKEESPORT, PA.
NEW YORK CHICAGO HARTFORD
CLEVELAND DETROIT LOS ANGELES
PHILADELPHIA DAYTON
GLOBE WIRE DIVISION, McKEESPORT, PA.

Honing Process

(Continued from Page 15)

more than half of the hone remains inside of the cylinder, with the stones uniformly pressed against the cylinder walls, at each end of the stroke. The honed bore consequently is truly round, absolutely straight from end to end without "bell-mouth" or "barrel," and accurate in size, all within the close limits mentioned above.

Speeds

The combination of speeds and feeds selected depends upon the size of bore, character and amount of metal to be removed, and quality of finish desired. Machine makers will give expert advice for any particular class of work.

An idea of the commercial production secured may be obtained from the following examples:—motor blocks of 6 or 8 cylinders honed at 60 to 100 an hour, V-type 8 cylinder motor blocks are mirror finished at an average of 90 blocks—720 cylinders—an hour. Crankshaft bearing holes in connecting rods are honed, 4 at a time, at the rate of 300 per hour and limits of plus or minus .0001" to .0003" are maintained. Diesel engine cylinders 14" diameter by 54" long, 10 minutes floor-to-floor.

Finish

The quality of finish produced by internal honing is superior to that of any other method. Its degree depends upon the grain and grade of the hones, number of honing operations, and length of time allowed. These factors in turn depend upon a number of variables in different kinds of work to be honed. For many purposes a single honing operation is sufficient, but for others a second honing or Mirror Finishing operation is desirable.

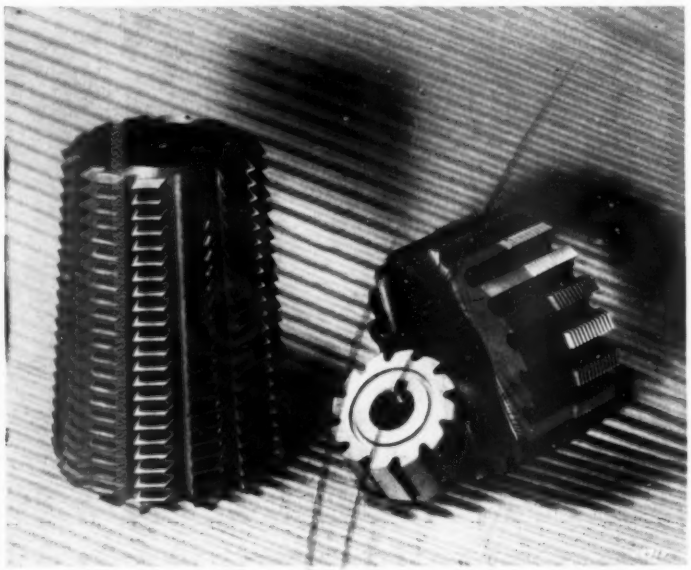
Mirror Finishing

An object drawn over a rough or uneven surface will bounce, jump, or vibrate. When the object is a piston ring and the surface over which it is drawn is the interior of an automobile engine cylinder it is obvious that the surfaces in contact must be smooth and uniform otherwise the piston rings will tend to vibrate, thus causing oil pumping, loss of power, waste of gasoline and excessive wear of rings. The extremely high speeds of the piston rings in the modern motor car require accurately round, straight cylinder bores having the smoothest surface it is possible to produce. Since internal honing made such a great improvement in finishing automobile cylinders, it was only natural that it should be called upon to create the higher finish necessary for successful operation of high speed motors. As a result Mirror Finish Honing was developed. This divides the honing operation into two steps, the first of which employs stones of grain 80 to 180 and leaves about .0005" of stock to be removed from the diameter by the second step which employs stones of grain 300 to 500 and finishes the interior surface of the cylinder to final size within exceedingly close limits. This operation must not be confused with lapping or polishing—honing produces a cut finish so fine, accurate, and uniform that the resulting surface resembles a mirror even in cast iron cylinders. This process is mentioned in connection with finishing cylinder walls, the very heart of an automobile motor, but it can be applied with equal advantage to finishing any other bores in which extreme accuracy and smoothness are required.

Size and Position of Holes Honed

So far, the smallest expanding hone made for commercial service is for holes ½" diameter. Our small-

(Continued on Page 28)



Illustrated are typical "Detroit"—ground to API and US Standards Thread—Milling Cutters.

TAPS—Ground Form threads checked with the finest Zeiss Equipment.

GAGES (thread)—Produced under controlled temperature and humidity. Burnished wear-resisting surface.

DIES (button and thread rolling)—Lower threading costs with DETRO steel dies.

CUTTERS (thread milling and worm hobbing)—Ground to the most rigid API or US Standards.

SERVICE—24-hour production to insure the most rapid delivery possible on special taps, etc.

There is a Detroit Tap representative in your territory.

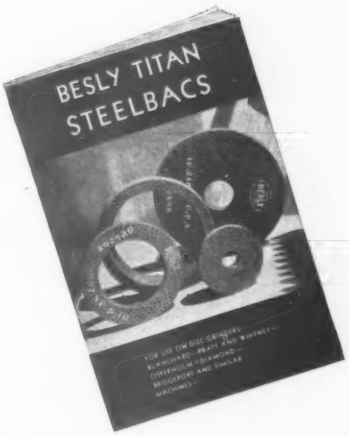
DETROIT TAP & TOOL COMPANY

8432 Butler Street Madison 9898 Detroit, Michigan

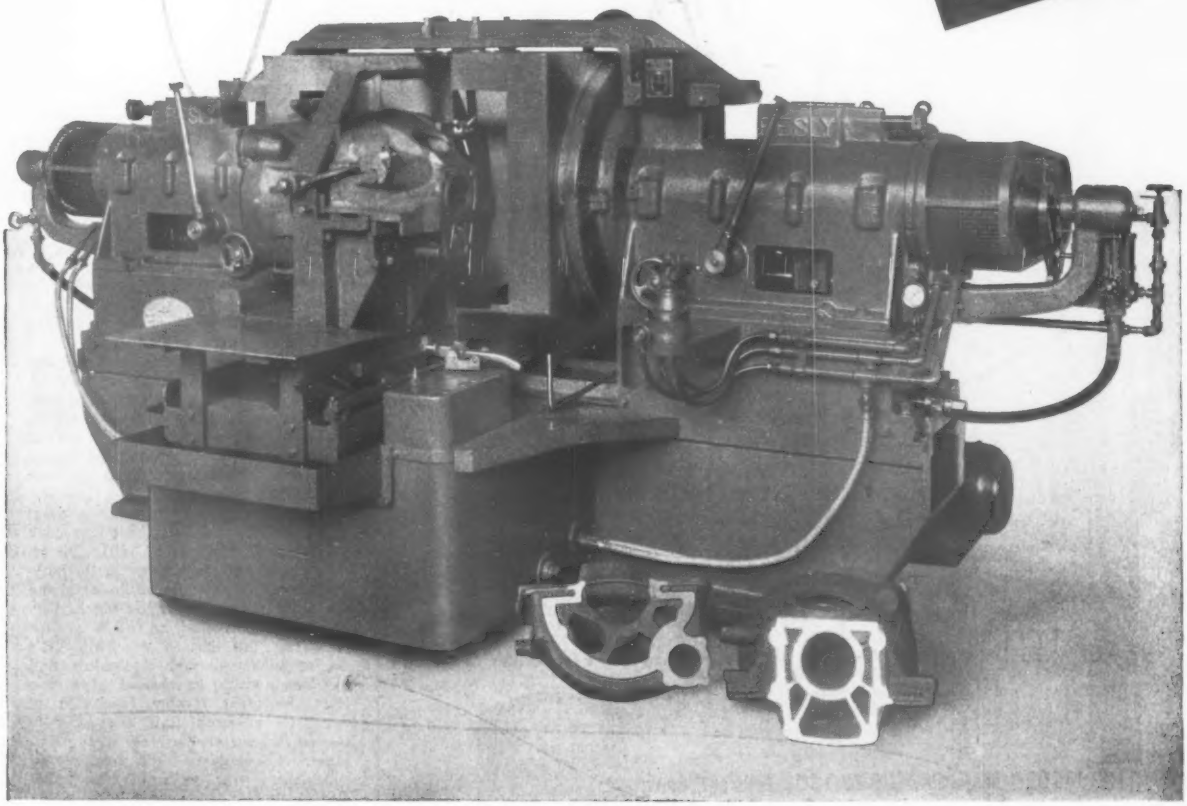
BESLY GRIND—Those Flat Surfaces

● Do you realize what this modern—powerful—Flat Surface Grinder will do toward reducing your manufacturing costs? Hydraulic Feed of grinding members to and from work — Hydraulically Operated Traveling Table carrying work between wheels. Fast, accurate, easy on operator. A remarkable tool for producing flat surfaces at a high production rate. ● These improved machines are equipped with Resinoid Bonded Grinding Discs three inches thick—Besly Titan Steelbacs which are making enviable records on all types of Face Grinding Machines.

Write for your copy of Booklet on Besly Titan Steelbacs.



PUT YOUR FLAT SURFACING PROBLEMS UP TO BESLY



CHARLES H. BESLY AND COMPANY

118-124 NORTH CLINTON STREET ★ CHICAGO, ILLINOIS

Honing Process

(Continued from Page 26)

er internal honers can be used effectively for finishing holes less than ½" diameter by employing a solid tool, or lap, suitably charged with abrasive. Greatest economy of floor space, highest speed and ease of handling are obtained when the axis of the hole to be honed is vertical. Our largest vertical machine hones cylinders up to 30" diameter by 90" long. Larger and longer work can be finished to better advantage on our Horizontal Honing Machines which are available in three standard sizes. 45° angle multiple honing is also practical when Automatic Hones with fibre wiper guides are used on our specialized Internal Honing Machines.

Connecting Rod Honing

Many manufacturers of connecting rods (where the bore is always larger than the thickness, and where there is the use of the thin shell bearings or the full floating bearings) are finding it economical and desirable to hone the rods at rest, that is, without chucking. This is accomplished in suitable fixture with floating workholders and with hone guided in a vertical plane, at the rate of 300 rods per hour, to a high degree of mirror finish and to an accuracy of within .0003", which is the tolerance allowed.

Coolant

It is especially important that a copious supply of clean coolant shall be carried to the hones continuously in order to keep the workpieces cool, to keep the cutting surfaces of the honing stones clean and free from clogging, to carry off quickly the minute particles of metal and abrasive produced by the honing process, and to maintain the accuracy and fine finish. This is assured in Self-Oiling Hydraulic Honing Machines by providing a large reservoir, a motor driven pump, settling chambers, and an efficient filter. Central filtering systems are also used. Special types of coolant have been developed for internal honing. Here, again, is a factor which should be considered carefully for different types of work in consultation with the hone manufacturers or honing machine manufacturers.

Briefly, internal honing is an extremely accurate finishing process, producing a high degree of smoothness and creating the final size of the bore by removing the microscopic ridges and irregularities left by reaming, fine boring, grinding or other preparatory operations, and bringing the whole surface down to base metal and to whatever degree of mirror finish may be wanted.

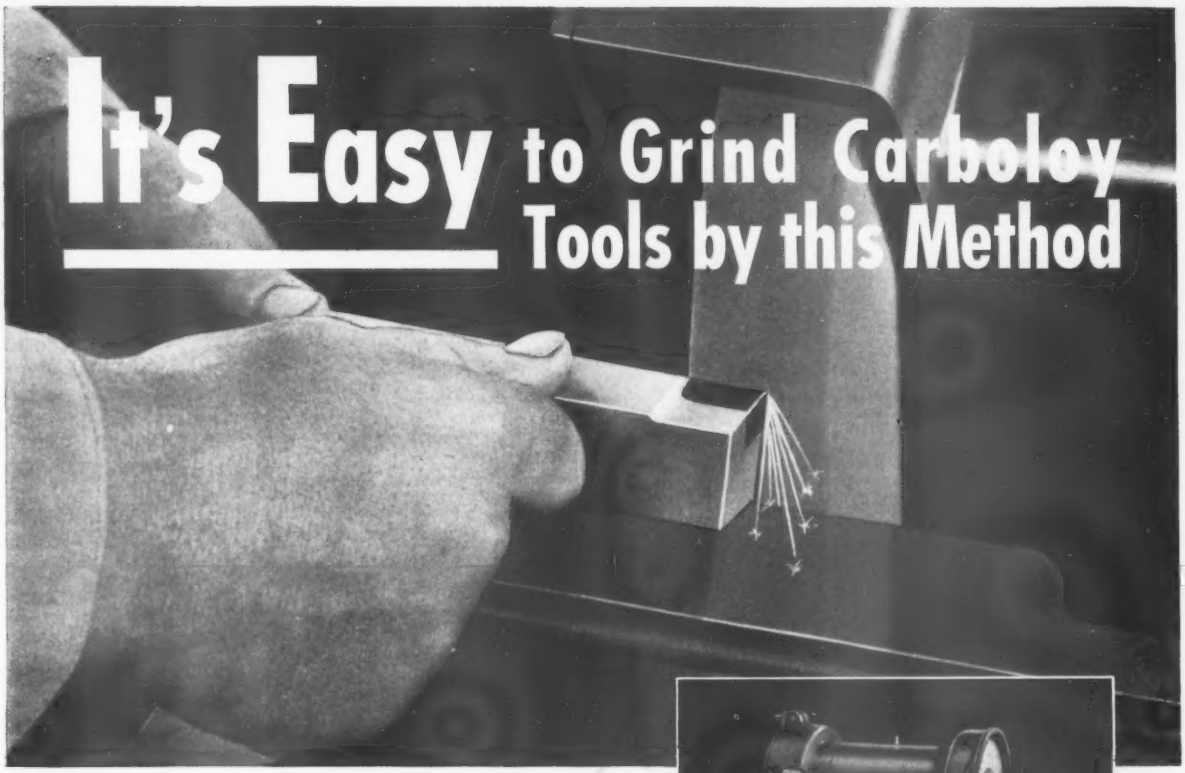
"BILL" GRAY

William Maxwell (Bill) Gray, for years actively associated with National Headquarters of American Society of Tool Engineers as a Vice President and a Director died May 15th at his home in Detroit.

Mr. Gray was a charter member of The Society and had been very active in it until about six months ago. His illness was at first not serious, but later he entered the Henry Ford Hospital in Detroit where his condition, due to heart complications, was considered alarming.

"Bill" as he was known to a great many friends and A.S.T.Eers was born in Detroit October 10th, 1891. He received his early education in the public schools of that city and also at the Cadillac School of Applied Mechanics. Later he completed an I.C.S. course receiving the degree of M.E. His work embraced tool designing and tool engineering in various capacities from Assistant Master Mechanic at the Timken-Detroit Axle Company to that of Chief Tool Engineer of the Kelvinator Corporation. His most recent connection was with the Ex-Cell-O Corporation in the capacity of sales and service engineer. He will be particularly remembered for his splendid work in organizing and completing the herculean task of transporting A.S.T.Eers and friends to the Machine Tool Show in Cleveland, via the chartered steamer from Detroit.

JACOBS
SINGLE PURPOSE
CHUCK
For High Production Drilling, Reaming and Tapping
★
Solid Taper Shank Perfectly Fits the Spindles for Absolute Accuracy
★
Positive Drive — No Slippage
★
Powerful collet jaws tightened with a wrench eliminate wear and damage to machine spindle—securely lock tool shank in engagement with the positive drive.
★
For Dimensions - Price List - and Part Numbers Write for Bulletin 6A
THE JACOBS MANUFACTURING CO., Hartford, Conn.
Jacobs Chucks



It's Easy to Grind Carboloy Tools by this Method

You Grind *More Rapidly* and Get *Better Results*

Today, by using the latest, most improved equipment and methods, the time required to grind Carboloy is but little more than that required for grinding ordinary steel tools. Milled and brazed tools, tools accidentally chipped, dull tools, and changes in shapes can be ground rapidly without injury to the carbide tips.

Reduced **grinding time lengthens productive periods, and reduces idle machine time.** ***Correct*** **tool grinding means closer limits and finer finish on your product.**

Take FULL advantage of the increased machine speeds, longer tool life, better finish, and greater accuracy possible with Carboloy cemented carbides. Grind your tools correctly, using the latest rapid method and equipment. Send for free Manual GM-36 containing approved, rapid grinding method and machine recommendations.

30 Minute Sound Slide-film describing rapid grinding method available on request.

CARBOLOY COMPANY, INC.
DETROIT, MICH.

CHICAGO • CLEVELAND • NEWARK • PITTSBURGH • PHILADELPHIA

CARBOLOY
REG. U. S. PAT. OFF.
CEMENTED CARBIDE TOOLS

Investigate the Carboloy 6-inch and 10-inch pedestal grinders. Made especially for grinding single point Carboloy tools rapidly and economically. 6-inch size for use with cup wheels, lapping discs and diamond wheels. 10-inch size adapted to rapid roughing on straight wheels and finishing on cup wheels. 6-inch grinder $200.00; 10-inch grinder $300.00 F. O. B. Detroit (less electrical equipment).

CARBOLOY COMPANY, INC.,
2983 E. Jefferson, Detroit.
Without obligation send us booklet GM-36 describing rapid grinding method and recommended equipment.

Name_____ Title_____

Company_____

City_____ State_____

HANDY ANDY'S ..WORKSHOP..

Got acquainted with Bill Uecker, Editorial Chairman of Pittsburgh, recently. (By correspondence, that is.) An up-and-coming chap who reflects credit on the boys who chose him for the job. You know, that's one thing about this A.S.T.E., you work for nothing—and how!—but when you're selected for committee the boys have paid you a real compliment. They feel that you can do your stuff, so, let's all resolve not to let them down. And you, Bill Uecker, I'm doggone glad to know you.

▼ ▼ ▼

You know, I get in a serious mood once in a while, like the actor who would play Hamlet but somehow gets cast in comedy roles and, the part assigned, reads his lines. Not that I don't like my fun, but writing, like pictures, is a matter of contrasts. With that preamble, Handy Andy essays the role of philosopher.

▼ ▼ ▼

"What force," asked one of a group, "exerts the greatest influence on civilization?" There were various answers; religion, science and invention, literature and art, but each of these is limited in scope and dependent on a major force. The greatest force is thought, or rather, thought resolved into action. Every advance of mankind, every stage in the evolution of society, had to be conceived in the human mind before assuming tangible shape. It does not follow that all thought is conducive to progress; the Puritanism launched by Cromwell resulted in temporary stagnation rather than progress, and similar checks if not actual retrogression have followed in the wake of other reform movements.

▼ ▼ ▼

The trouble with any reform movement is that the ultimate results cannot be clearly predetermined by the masses of the people, nor even by the sponsors. But a small percentage of people actually think; the process is too painful. The masses are swayed by prejudice and oratory, are at the mercy of organized minorities, and leaders are often zealots, obsessionists with a single track mind. They have to be, else they cannot move people out of the rut of habit. It is typical of the masses of the people that they are afraid of the new, the unknown. But few men have set their courses toward the poles.

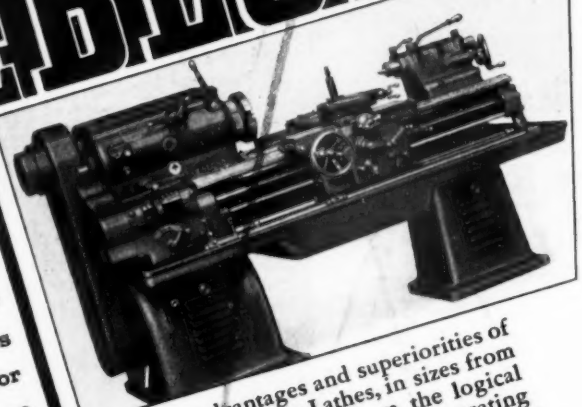
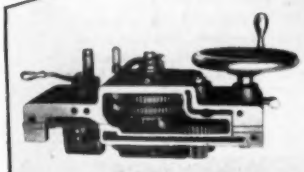
▼ ▼ ▼

In this Age, perhaps the most marvelous of all time in material if not cultural progress, (Hellenic Greece is yet to be transcended) there is little need to plunge blindly into the unknown nor to fear it. New things are being tried, with varying success, in all parts of the world. Then, there is history, with its lessons. Man tries, and makes mistakes, and on mistakes builds success; we can now, in an age of mass enlightenment, begin to reason out the why of mistakes rather than merely deplore their happening. Now, constructive thinkers can largely influence contemporary thought and thus help to shape future trends.

▼ ▼ ▼

Heretofore, with few exceptions, man has largely concerned him-

(Continued on Page 32)

ONLY IN . . .
LEBLOND

You Get LEBLOND Advantages and Superior Performance
The LeBlond new and improved apron is simple in operation, positive in lubrication. The double walled box-type one piece casting has no bolted on brackets to work loose or get out of alignment. Rack wheel, rack pinion and handwheel mounted on anti-friction bearings.
The many advantages and superiorities of LeBlond Heavy Duty Lathes, in sizes from 12" to 36", have made them the logical choice of all critical buyers. Incorporating every new proved development and, in addition, many exclusive features, LeBlond offers greater value per dollar invested, sharp production economies, more efficient, continuous, trouble-free operation. You cannot afford not to investigate LeBlond Lathes. Send for free literature.
HEAVY DUTY LATHES

The R. K. LEBLOND MACHINE TOOL CO., CINCINNATI, O.
20 North Wacker Drive, Chicago 103 Lafayette St., New York

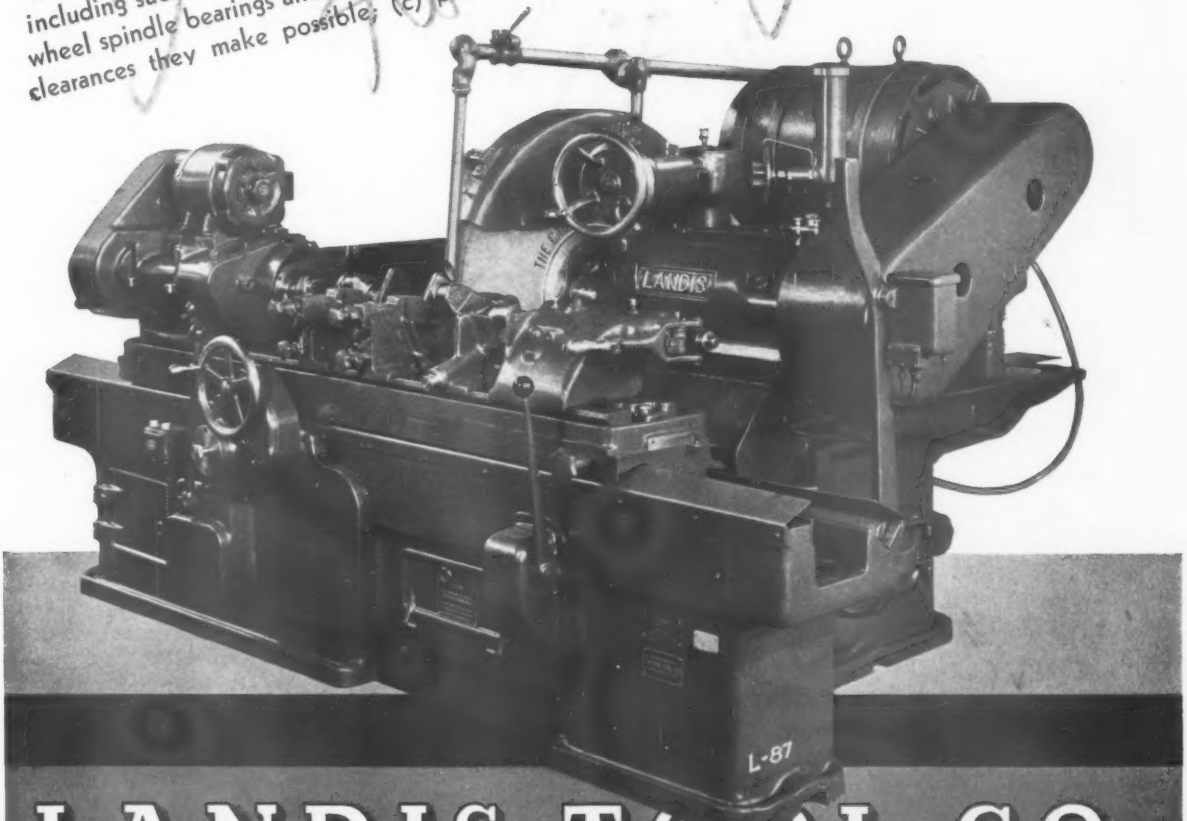
If you grind crank shaft line bearings

If you grind crankshaft line bearings you will be interested in the new Landis Type D Plain Hydraulic Grinder shown below.

It will (a) produce rapidly because of its weight, power, efficient drives and availability with a wheel as large as 42" in diameter; (b) produce accurate work because of careful design and construction including such features as Landis babbitt lined steel wheel spindle bearings and the close wheel spindle clearances they make possible; (c) produce consistently because spindles, bearings, guide-ways and like parts are more than ample in size and are automatically lubricated with filtered oil and (d) make operating easier because of a work center height as low as 36" and the fact that the operator can get close to the machine for loading and unloading.

But why not get *all* the details? They are in catalog A-35. Want a copy?

199



LANDIS TOOL CO.

WAYNESBORO, PENNSYLVANIA, U. S. A.

Handy-Andy

(Continued from Page 30)

self with material progress, with mechanical advances. Engineers have evolved if not new principles of mechanics, at least new applications of old principles. We have evolved an industrial civilization—the Machine Age—and it just happens that coincidental with that civilization there has also been created a new school of thought. Man, belatedly, is beginning to think in terms of man.

We stand at the threshold of a new thought, but hesitate to enter because it means a transition from the known to the unknown. Yet, paradoxically, unless we enter and embrace the new we are in imminent danger of destroying the old. The Machine Age must become humanized if it is to survive.

▼ ▼ ▼

We see a world in the throes of unrest, and reactionism fears the results, yet, the unrest is but a manifestation of mass progress. At no time have the masses enjoyed such general education, or, where education lags, have people so evinced a desire to attain it. That the unrest goes to extremes in places is because there the masses are not educated enough; they have not absorbed knowledge so suddenly loosed. Yet, in those lands where mass enlightenment prevails, there progress is orderly nor marked with violent revolution. Advanced societies evolve progress rather than effect it by violence.

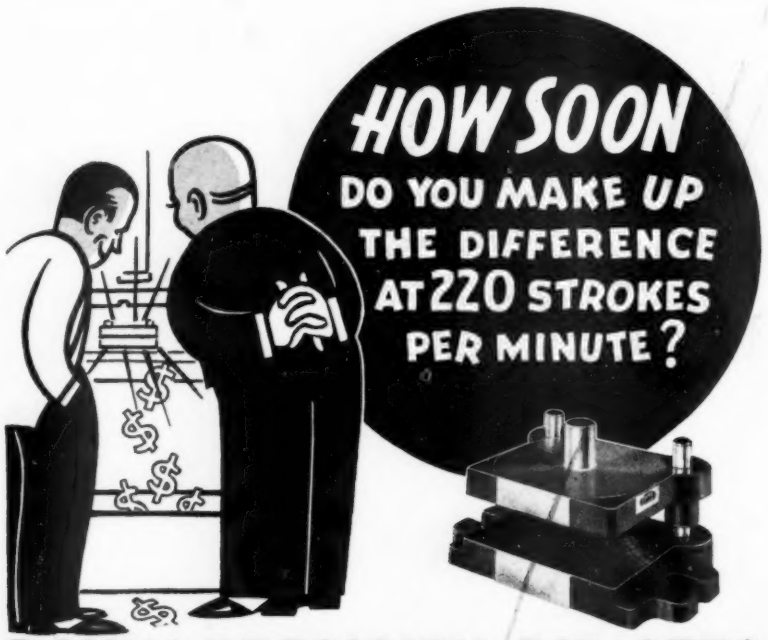
For the engineers, the course seems clearly charted. Industry faces vast problems as labor organization spreads beyond control of opportunist leaders and a sympathetic government, problems that become the more complex because management is slow to realize that the solution rests with the engineers, not with the lawyers and accountants who largely dictate industrial policy. Which, resolved to a conclusion, means that engineers should work hand in glove with management, should be a part of it, also, that engineers should temper technical science with liberal thought.

▼ ▼ ▼

To foster a mass market in the face of rising labor costs—and that means all costs—it is necessary to evolve new and advanced methods of tooling and processing, to prevail against resistance to speed-up it is necessary to evolve methods of production that will net more product with a lesser man effort. You can't force issues against prejudice; the logical thing is to create new methods that will do old things in a better and easier way. These things must be thought out, and doubtless, engineers can think them out. They must.

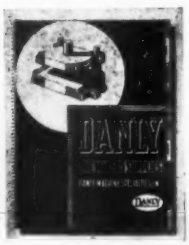
Do you see, now, why I incline to our Speakers Club, and would see this school of liberal thought spread to other chapters? It is a truism that engineers are of superior intelligence compared to many other vocations, but they are inclined to think in mechanical rather than in liberal terms. Speakers clubs stimulate liberal thought, and liberalism opens vast vistas into the unknown, tend to dissipate fear of the unknown. Besides, the clubs promote tolerance and good fellowship.

Handy Andy.



DANLY PRECISION DIE SETS

SAVE YOU MONEY—HERE'S WHY:



The Danly Catalog makes it easy to select the proper die set for the job at hand. Ask for your copy.

● True, you pay a little more for a Danly Precision Die Set because the guide posts and bushings are perfectly fitted to within ± 1/10,000". That's what gives you the absolute accuracy of die movement that means perfectly made parts. It's one of the reasons why Danly Precision Die Sets can operate at a higher rate of speed—produce more parts before regrinding—protect the dies, as ordinary sets can't. Try a Danly Precision Die Set next time and prove to yourself the difference in long-time economy.

DANLY MACHINE SPECIALTIES, Inc., 2214 S. 52nd Ave., Chicago, Ill.
513 E. Buffalo Street, Milwaukee, Wis.
Long Island City, N. Y., 36-12 34th Street
Dayton, Ohio, 990 E. Monument Avenue
Detroit, Michigan, 1549 Temple Avenue
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DANLY PRECISION DIE SETS

USE BARBER-COLMAN GROUND HOBS *for Accuracy*

Enlarged Fifty Times Size Tooth Form Splits The Line

Design right, material right, machining right, heat treatment right, finishing by Barber-Colman grinding right — Barber-Colman Ground Hobs *must* be right. When enlarged 50 times, the projected tooth-form splits the line on an accurate layout. In service, Barber-Colman Ground Hobs provide the ultimate in accuracy, fine finish, high production, and durability. Use Barber-Colman Ground Hobs for accuracy, service, *value*.

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PRODUCTS

MILLING CUTTERS, HOBS, HOBBING MACHINES, HOB SHARPENING MACHINES, REAMERS, REAMER SHARPENING MACHINES, SPECIAL TOOLS

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Hodges Machinery Company
544 New Center Building

MILWAUKEE, WISCONSIN
Dumser & Schroeder
610 West Michigan St.

Chapter News

(Continued from Page 24)

don asked that members offer suggestions as to topics and speakers.

The speaker, Mr. W. W. Broughton of the New Jersey Zinc Company, started his subject, "Die Castings—When and How," by some interesting movies, showing the mining, melting and alloying of material and also the manufacture of various die cast parts, including finishing by plating and painting. Mr. Broughton then followed with a short talk about the applications and uses of zinc die castings. This was illustrated by samples from almost every field of manufacture.

Following are some of those who entered into the discussion which Mr. Broughton suggested as the most interesting approach to his subject.

Mr. A. F. Herb, Miller Printing Machinery Co.; Mr. Gregory Grace, Robertshaw Thermostat Co.; Mr. Wm. Owen, Pittsburgh Plate Glass Co.; Mr. E. E. Griffiths, W. E. & Mfg. Co.; Mr. A. F. Murray, W. E. & Mfg. Co.; Mr. W. T. Cox, Pittsburgh Equitable Meter Co.; Mr. J. G. Bunker, W. E. & Mfg. Co.; Mr. J. R. Barbor, W. A. B. Co.; Mr. S. A. Huffman, Miller Printing Machine Co.

In closing, Mr. Broughton offered the following pamphlets to those interested.

"A Visual Report of Progress—Zinc Alloy Die Castings." "Inserts in Die Castings Widen Field of Application." Reprinted from "Machine Design," March, 1937.

Meeting adjourned at 9:55 P.M.

▼ ▼ ▼

RACINE

T. J. Santry, Chapter Publicity Chairman, 1615 Racine Street, Racine

Efforts of the Racine Chapter of the American Society of Tool Engineers to bring about closer cooperation between the Vocational School and the manufacturing plants of Racine were commended Monday night, May 17th, by Mayor Roy Spencer, one of the honored guests at the monthly dinner meeting of the society at the Racine Vocational School.

The mayor told of the scarcity of skilled workers in Racine, and expressed the belief that, if the manufacturers will inform the faculty of the vocational school of their needs, they will attempt to train boys in those crafts.

H. D. Hiatt of the Nash Motors Co., was general chairman. An inspection of the school followed the dinner program. During some of Mr. Hiatt's remarks, he stated there should be co-operation between the school and the factories, as boys of today are between the two and their rise or failure depends largely upon both.

Mr. Harry A. Sedgwick, General Superintendent of Cutler-Hammer, Inc., of Milwaukee, Wisconsin, spoke on "Planning and Preparing for the Manufacture of a Product." His talk was followed by one on "Economics Resulting from Good Planning and Good Designing," by Mr. Arthur Johnson, Chief Tool Engineer of the same company.

Director Thomas Rees of the Vocational school and other faculty members, also spoke.

The meeting was the largest of the season and was attended by 125 members, invited guests and boys of the Junior Engineers Club.

Announcement was made during the meeting that the Society's Annual Frolic will be held at Meadowbrook Country Club, Racine, on June 4th. Golf, Slow Pitch Outdoor Ball, Horseshoe Pitching and similar contests will be arranged, and prizes will be awarded to the winners in the various events as well as a number of door prizes at the dinner.

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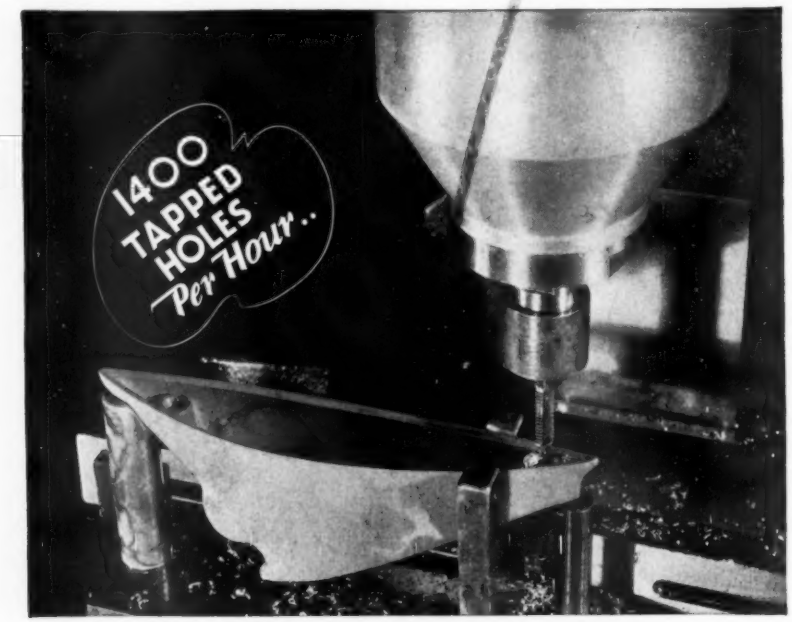
TOLEDO

Walter Ulrich, Chapter Publicity Chairman 2335 Cherry Street, Toledo, Ohio

The second meeting of the newly organized Toledo Chapter of The American Society of Tool Engineers

(Continued on Page 36)



Trouble-makers, these odd-shaped die castings. With other types of equipment the handling time for this job was much greater than the tapping time, resulting in low production, unnecessary operator fatigue.

But the Haskins Method makes another tough job easy. A simple sliding fixture — no clamps — operator fatigue reduced to a minimum — production increased to 700 pieces per hour!

Have **high-speed, precision** tapping in your plant. Have longer tap life — lower tapping costs — at no extra cost over your present method.

Investigate the **Haskins** Method.

PRODUCTION LINE PROCESS — illustrated above is No. 84 of a series of case histories showing tough jobs made easy — done better and faster — by the Haskins Method.

Material, Zinc base die casting.
Net Production, 700 pcs. per hr.
Size of Tap .....5/16"-18
Depth of Tapped Hole..½"
RPM of Tap "in" 1750
RPM of Tap "out" ...3500

Write for a complete, illustrated booklet describing the Haskins Tapper in detail.
R. G. Haskins Company, 4642 W. Fulton Street, Chicago.

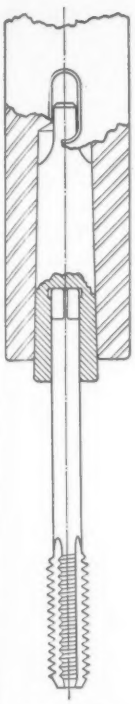
Haskins
Hi-Speed TAPPING EQUIPMENT
with Greater Adaptability

Standardize . . .

WITH SCULLY • JONES METHODS OF DRIVING TAPS

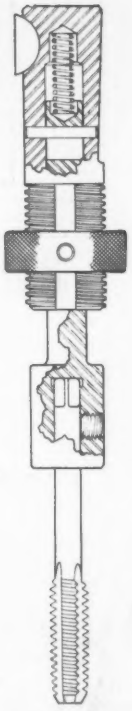
Universally used for Individual or Mass Production

See Our Standard Tool Catalog Number 105

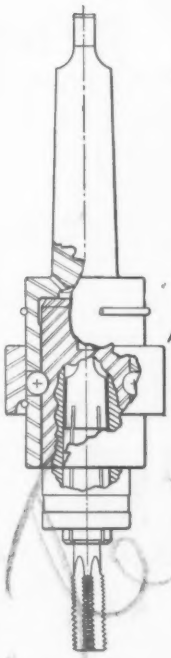


SOLID TYPE TAP CHUCK DRIVER

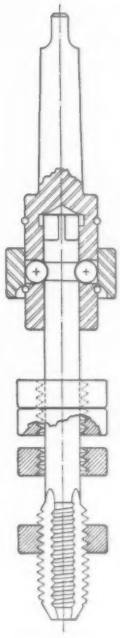
FLOATING HOLDER TAP DRIVER



ADJUSTABLE ADAPTER, COMPRESSION TYPE, TAP DRIVER

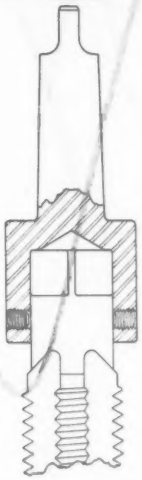


MAGIC TYPE QUICK CHANGE TAP DRIVER



QUICK CHANGE TAP DRIVER

FLOATING, TENSION TYPE, TAP DRIVER



HEAVY DUTY DRIVER FOR LARGE SIZE TAPS

CLOSE CENTER TAP DRIVER

STYLE "A" SPRING COMPRESSION TAP DRIVER

SCULLY • JONES & CO.

1903 SOUTH ROCKWELL ST., CHICAGO, ILLINOIS

UNIVERSAL STANDARD
DRILL BUSHINGS
MADE TO A. S. A. SIZES
LOWEST COST -:- LONGEST LIFE
UNIVERSAL ENGINEERING CO.
FRANKENMUTH, MICHIGAN

GRINDING SPECIALISTS
RENU into NEW
YOUR OLD WORN OUT MILLING CUTTERS,
SAWS, ENDMILLS, DRILLS AND REAMERS
RENU TOOL CO.
275 E. MILWAUKEE, DETROIT, MICH. Phone MAdison 0560
TOOLS RENEWED BY RENU CUT FASTER

GETTING RESULTS
WITH GAIRING HOLLOW MILLS

Longer service life with fewer interruptions and infrequent replacement blades—that's what you get when you specify "Gairing Adjustable Blade Hollow Mills." Production moves along smoothly and speedily, which adds much to profits.

Whatever your cutting tool problems may be, consult Gairing Engineers. Recent improvements in hollow mill construction, developed by our engineers, are materially lowering cutting tool costs. We can be of great assistance to you in giving helpful advice on such problems.

Your local Gairing representative will be glad to tell you more about this service.

Catalog No. 30, illustrated, will be mailed to responsible parties upon request.

THE GAIRING TOOL CO.
1629-35 WEST LAFAYETTE · DETROIT, MICHIGAN

Drilling and Tapping

(Continued from Page 10)

sink 5 holes ⅜" tap in all parts. Ream 2 holes .378" diameter in all parts.

Location "B", Right Head—Countersink 2 holes for ⅜" tap in one transmission case only.

Position 4, Location "A", Left and Right Head—Tap same holes drilled in position No. 2.

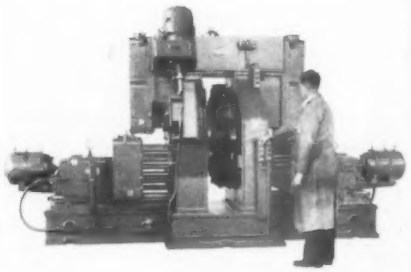
Location "B", Left Head—Tap 5 holes for ⅜" thread in all parts.

Location "B", Right Head—Tap 1 hole for ½" pipe thread in all parts. Tap 2 holes for ⅜" thread in one transmission case only.

These operations were performed on a two-way horizontal combination drilling and tapping machine. This machine was built up of two self-contained "Holeunits" having a total of 41 drilling spindles with nose adjustment and running in anti-friction bearings, and was also equipped with a reversing motor drive tapping unit of 14 individual lead screw tapping spindles. The trunnion on this machine was automatically indexed. A photograph of this machine is also shown.

By developing a method for performing this sequence of operations, it was possible for the purchaser to perform all of the operations noted above on two machines, with two operators, thereby cutting the cost of these operations more than fifty per cent.

The second machine described performs all operations required for top and bottom, as well as both sides of the case.



Chapter News

(Continued from Page 34)

was called to order at 6:30 o'clock, May 19th, 1937, in the Dining Room of The Toledo Yacht Club by the Chairman, Mr. Otto Winters, Industrial Engineer of The Kent Owens Machine Co.

Chairman Winters then introduced our out-of-town visitors as follows: Mr. E. Hassig, Works Manager for The Wetmore Reamer Co. and a member of The Milwaukee Chapter, who responded with remarks on the financial condition of

the Milwaukee Chapter and their methods of entertainment. Then Mr. B. W. Decon and Mr. W. J. Fors of The Detroit Chapter; Mr. Geo. R. Benz and Mr. Frank Leckie of Detroit.

Chairman Winters then introduced our out-of-town visitors as fol- a few remarks, introduced the speaker of the evening, Mr. E. Q. Beckwith of the Phillips Petroleum Co. of Detroit, Michigan. Mr. Beckwith delivered a paper on "Liquified Petroleum Gases and Their Industrial Application." A discussion of the subject followed.

Chairman Winters then called for a vote on the question, "Shall we have a dinner dance on June 18th, or just a dance?" The vote favored a dinner dance. A favorable vote was taken on holding the dinner dance in the Toledo Yacht Club, June 18, 1937.

A vote was called for on the question, "Shall we have a meeting in June?" The vote disapproved of a meeting in June.

There being no further business, the meeting was closed and the facilities of the club turned over to the members and their friends to enjoy the remainder of the evening.

TWIN CITIES CHAPTER

Gunnar G. Widen, Secretary
1408 Park Ave., Minneapolis, Minn.

Dinner was served at 6:30 in the dining room at the University of Minnesota Union to about seventy persons who met for the purpose of forming a chapter of the American Society of Tool Engineers. Mr. Geo. W. Wise, temporary chairman, acted as toastmaster and introduced two visitors from the National Headquarters in Detroit—the speaker for the evening, Mr. Ford R. Lamb, National Executive Secretary and past president and Mr. Frank R. Crone, National Treasurer.

Mr. Lamb gave a very interesting talk on "Mass Production and the Tool Engineer." The speaker referred to the important part Tool Engineering has played in mass production of today. He also pointed out the recognition Tool Engineers have gained in the last few years and gave a brief outline of the origin, control and financial standing of the Society. The speaker also mentioned the many benefits derived through membership in the Society, such as standard data sheets, meetings and technical papers, meeting and contacting other members.

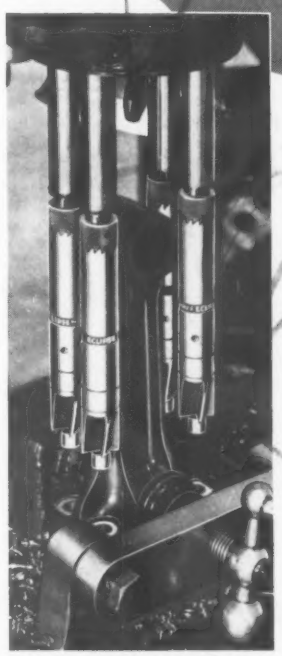
As forty-two applications for membership had been received, an application for a charter was made and granted. The new chapter is to be known as Twin Cities Chapter No. 11 of American Society of Tool Engineers.

It was decided that four officers be elected, namely, Chairman, Vice Chairman, Treasurer and Secretary. Mr. Lamb appointed Mr. Wise, Mr. Kay and Mr. Pennington as tellers and declared nomination open for Chairman. Mr. Geo. W. Wise, Mr. A. G. Anderson and Mr. Kenneth K. Roby were nominated; Mr. Roby, receiving twenty-three votes, was declared duly elected.

Mr. E. Huot was nominated and unanimously elected as Vice Chairman. Mr. C. V. Bakule was nominated and unanimously elected as Treasurer. Mr. Donald McKay and Mr. Gunnar G. Widen were nominated for Secretary; Mr. Widen, receiving twenty-one votes, was declared duly elected. Mr. McKay received twenty votes.

Mr. Lamb introduced the newly elected officers and turned over the Charter, constitution and by-laws, corporation and membership records and other equipment to the officers of the Chapter.

A Complete
ENGINEERING SERVICE



Eclipse variable length tools for counterboring stud holes in airplane motor connecting rod—depth limit .001 in.

On High Production End-Cutting Tools--
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Thorough understanding of facing, counterboring, core drilling and multi-diameter boring problems as a result of long years of experience specializing in designing and manufacturing this class of cutting tools enables our staff to develop advanced types of cost reducing tools for your particular applications.

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Designers and tool engineers are invited to avail themselves of our consulting service on all reaming operations—standard or special. We build practical and efficient special tools to decrease your manufacturing costs.

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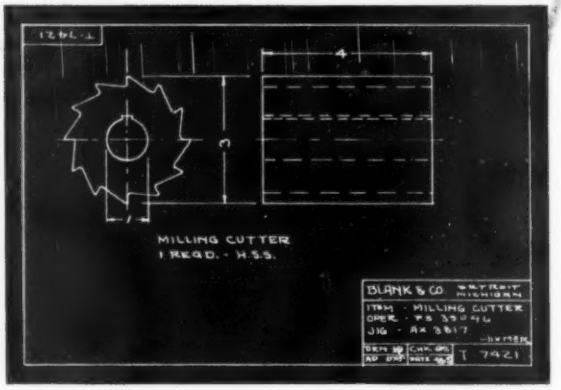
Just Some Teeth Around a Blank . . . .



That, to some people, is a milling cutter and is comparable to designing an automobile by putting four wheels on a box.

●

For maximum efficiency milling cutters must be engineered

Let us Study Your Problems

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Milling Cutter Engineers

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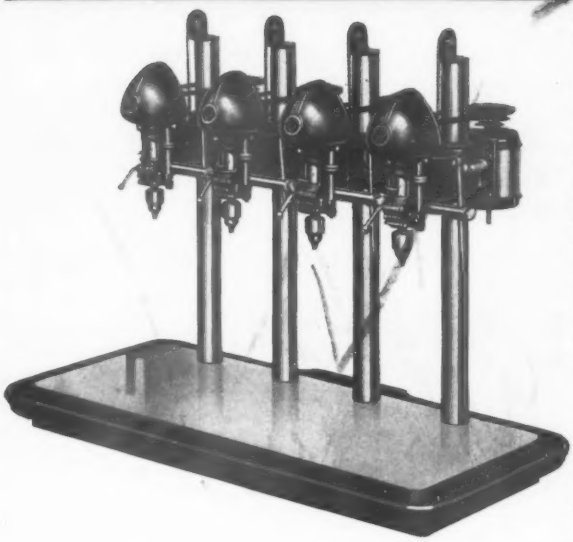
New 14 in. 4-Spindle Drill Presses



Overall dimensions: 26" x 57"; 45" high. Table surface on base: 20¼" x 51". Oil trough 2", tapped for ½" pipe at rear. Maximum distance, chuck to table, 25½". Center to center distance of spindles, 11". Capacity of Jacobs chucks, No. 60 to ½" drills. Drills to center of 14" circle.

Spindle speeds, Nos. 1001 and 1002: 590, 1275, 2450 and 5000 r.p.m.

Spindle speeds, Nos. 1003 and 1004: 390, 745, 1280 and 2050 r.p.m.

Spindle carried on New Departure self-sealed ball bearings; lubricated at the factory for the entire life of the bearing. No further lubrication necessary. Spindle pulley is also carried on New Departure self-sealed ball bearing, and is designed to take all belt pull; no belt load transmitted to spindle. Spindle is double-splined, with large radial spline faces for long wear and sensitive action.

Spindles are interchangeable. Graduated quills with adjustable depth pointers. Threaded stop rods with knurled nuts. Straight feed lever standard, but "pilot wheel" available extra.

Heads counterweighted for fast, easy adjustment.

Write for name of nearest Delta dealer and complete descriptive circular.

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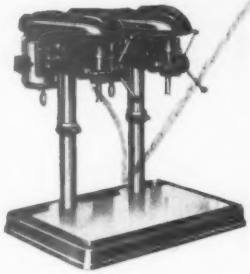
The unusual value presented by the standard 17" floor and bench-model drills introduced by us in 1936 has led to a demand for a similar machine of the manufacturing type, and the two-spindle drill press shown at the right is the result of this demand. Heads are interchangeable, so that either two spindles with No. 2 Morse tapers, two spindles with Jacobs chucks, or one of each type can be used on the machine as desired. Spindles also may be quickly interchanged without changing heads.

$224.25 . . . with No. 2 Morse Taper Spindles, less Motor.



Delta Mfg. Co.

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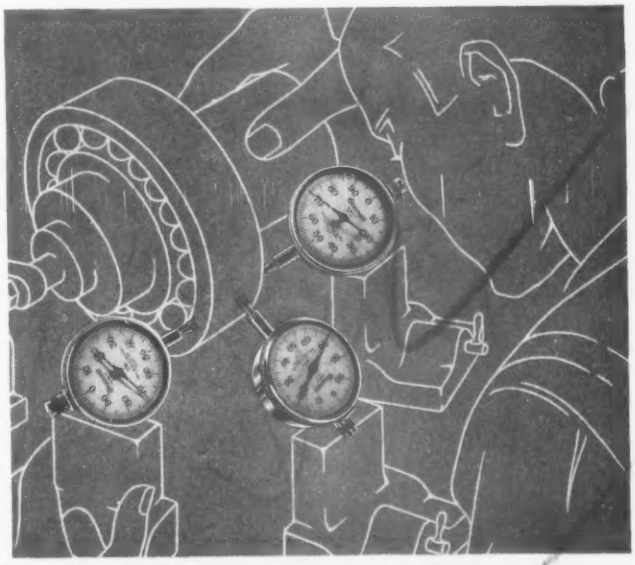
STARRETT DIAL INDICATORS ARRANGED FOR PRODUCTION INSPECTION OF BEARINGS



For

PRODUCTION INSPECTION

Starrett Dial Indicators are made in a complete range of standard sizes and dial calibrations or special indicators can be developed to suit your gaging operations. The second edition of the Starrett Dial Indicator Catalog AA just off the press illustrates and describes the entire line of STARRETT and LAST WORD Indicators. Write for a copy.

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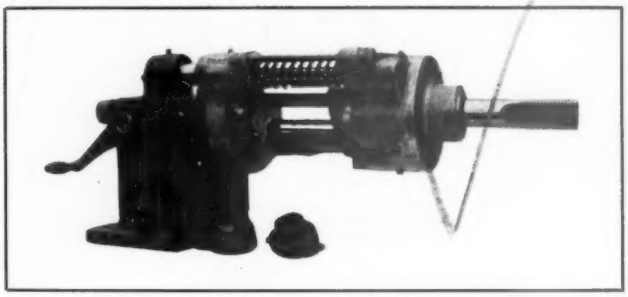
Drill Head and Fixture for drilling bearing retainer, horizontally on Kingsbury machine. Work located and clamped by Q-C lock.

Head and fixture designed and built by Q-C.



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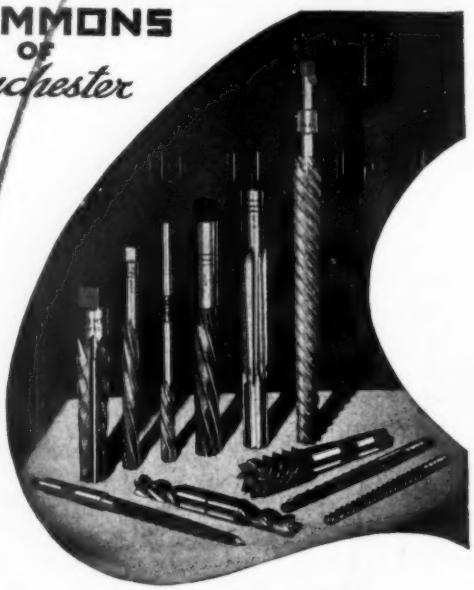

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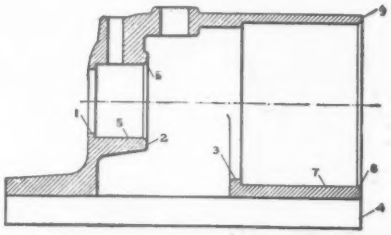

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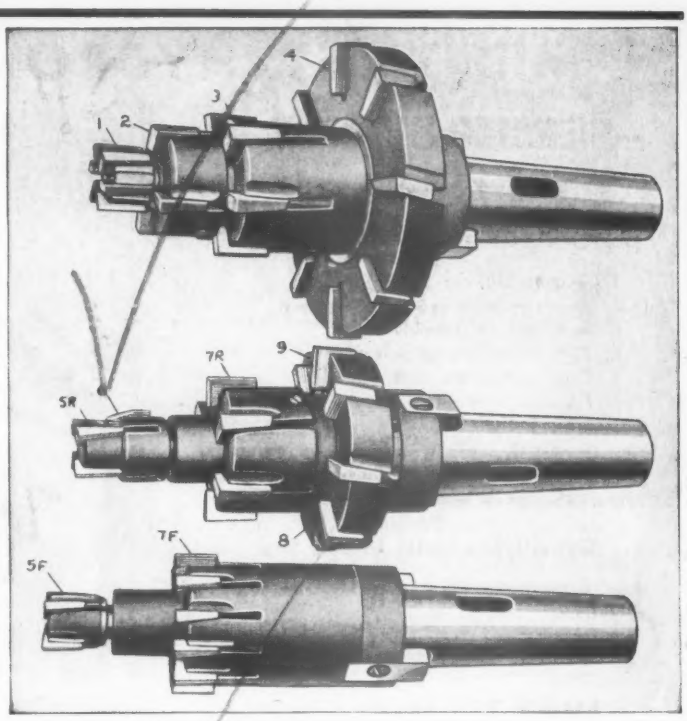

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THE CUTTER is a disc of the best tool steel with ten teeth, each tooth having a prescribed increase in radial length over the preceding tooth, thus comprising, in effect, ten cutting tools. The first nine teeth rough out the thread progressively in nine heavy measured cuts, and the tenth tooth finishes the thread. The responsibility of the operator is reduced to indexing the cutter and reversing the lathe. The thread tool does the rest.

Bulletin 110-A

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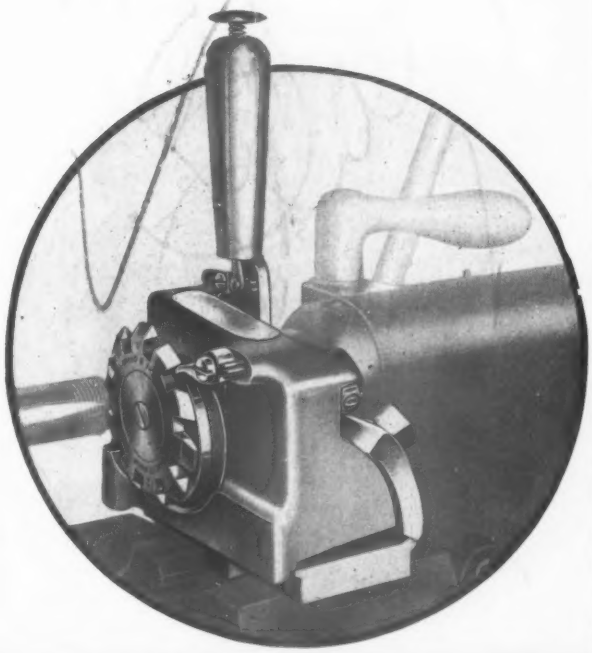

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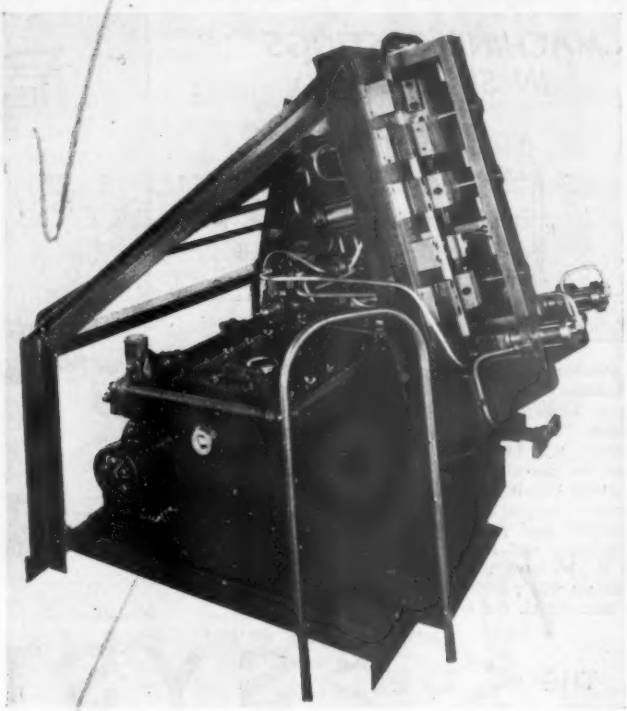

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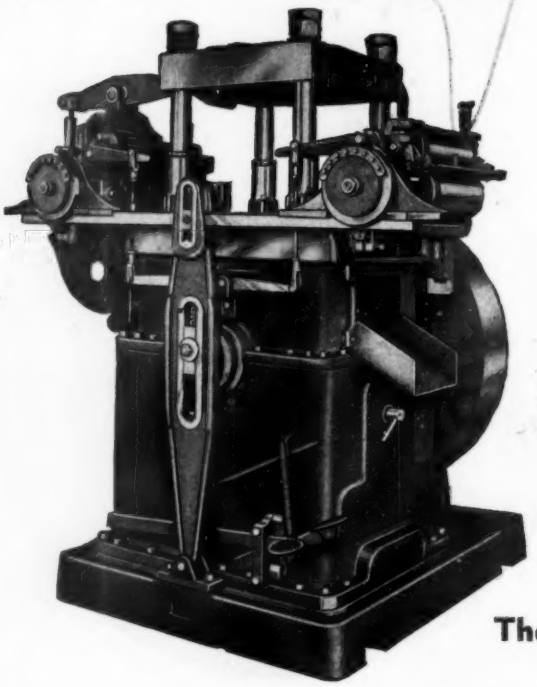

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"Tool Steel Simplified"—a handbook of modern practice for the man who makes tools. This is a hard bound complete text book of 316 pages, profusely illustrated with many photographs, diagrams, charts, etc.

"No one can understand a tool problem like the men who work with it daily, and the purpose of this book is to place in the hands of these men the type of knowledge possessed by the tool steel expert so that they can more completely control the progress of their work."

Frank R. Palmer, assistant to the President of the Carpenter Steel Company is the author. We recommend this book highly to readers of this publication. This book may be had by addressing the Carpenter Steel Company, Dept. T-E, Reading, Pennsylvania. Price $1.00 postpaid in U.S.A., elsewhere $3.50.

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"Manual of Lathe Operation" recently released by the Engineering Department of the Atlas Press Company, Kalamazoo, Michigan. This up-to-date treatise pictures clearly how to operate the modern lathe and includes easy-to-understand technical data for machining new metals, alloys, plastics, etc., 272 pages — metal binding, opens easily and lies flat. $1.00 delivered. Write Atlas Press Company, 1819 North Pitcher Street, Kalamazoo, Michigan.

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"Rex-Weld and Rex-Tube Flexible Metal Hose"—the new catalogue of the Chicago Metal Hose Corporation, Maywood, Illinois, gives a comprehensive picture story of the how-when-and-where to use flexible metal hose to advantage. Technical data is given on the use of flexible metal hose for saturated steam and superheated steam, for the conveyance of fluids and chemicals as well as for numerous special uses. It also illustrates and explains the latest developments in flexible metal hose and construction which it is claimed paves the way for new economies and new high performance records.

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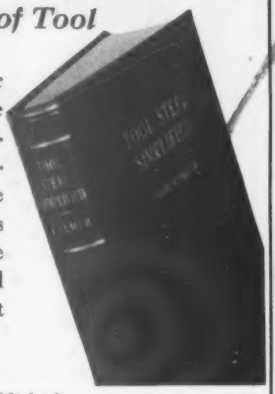
How to Select and Heat Treat Tool Steel

To Make Any Kind of Tool



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By FRANK R. PALMER

Assistant to the President

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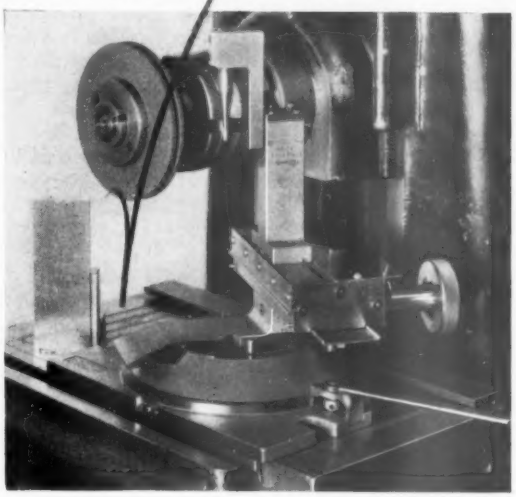
Patented June 5, 1934, other patents pending.



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FIXTURE CLAMPING
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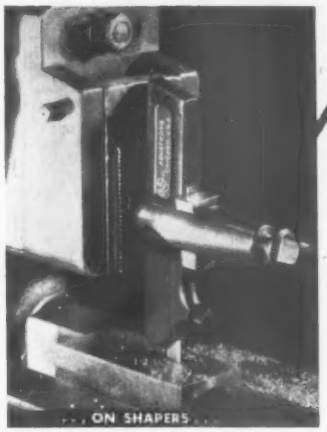

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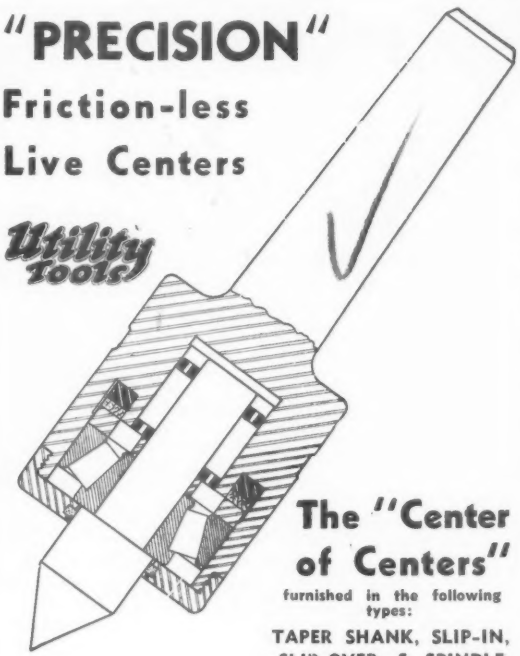
Friction-less Live Centers

Utility Tools



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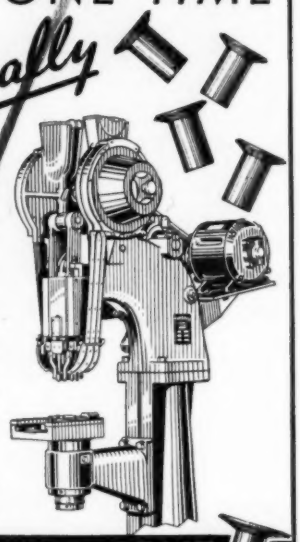

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When Planning the Removal of Metal

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We invite you to take advantage of the service of our engineering staff.

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Manufacturers of
Broaches and Broaching Equipment

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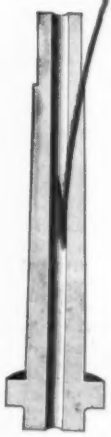

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Any grade of steel---
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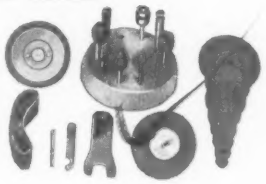
FLEXIBLE SHAFT EQUIPMENT
OF HIGH QUALITY ONLY

¼ H.P. RFM4

This Type RFM4 Machine with Attachments a very popular machine among the tool and die makers.



10,000 R.P.M. Attachment

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in
ONE OPERATION
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PRECISION BORED
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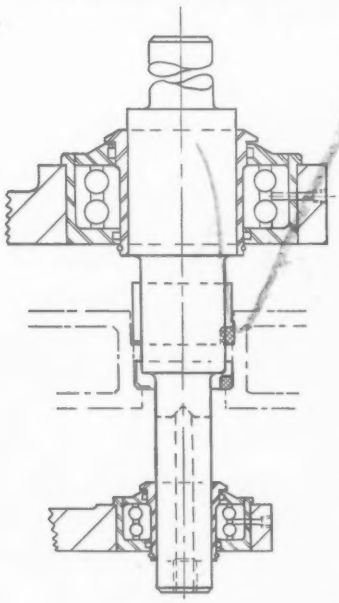

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"TRU-GRIP"

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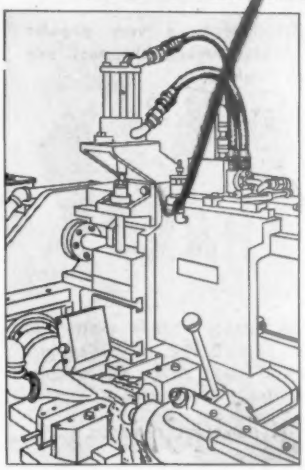
ALL-METAL FLEXIBLE CONNECTIONS FOR MACHINE TOOL APPLICATIONS



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The strongest, most durable, all-metal flexible connections for machine tool application. Fabricated by the exclusive REX-WELD process which "works" the tube wall only half as much as other forming methods, REX-WELD flexible connections have a proportionately longer service life. Far superior to rubber because they are not subject to deterioration. Absolutely leak-proof and seep-proof under pressures many times greater than used in this service. Write for information on specific applications.

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(Formerly Chicago Tubing and Braiding Company—Est. 1902)

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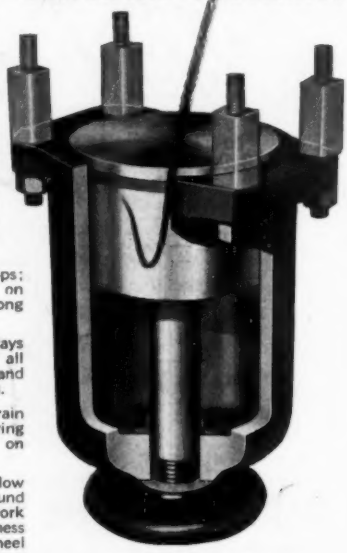
NEW IMPROVED UNIVERSAL PNEUMATIC DIE CUSHION



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6. Eliminates excessive strain on drawn parts, assuring normal metal strength on finished work.
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8. Leader pin (piston stem) fully guided, die cushions rigidly mounted eliminating all piston deflection.
9. Moderately priced, accurately built, simple in design and universal in application.

Made in seven sizes with full automatic pressure control and precision adjustment feature adaptable to a wide range of punch press operations

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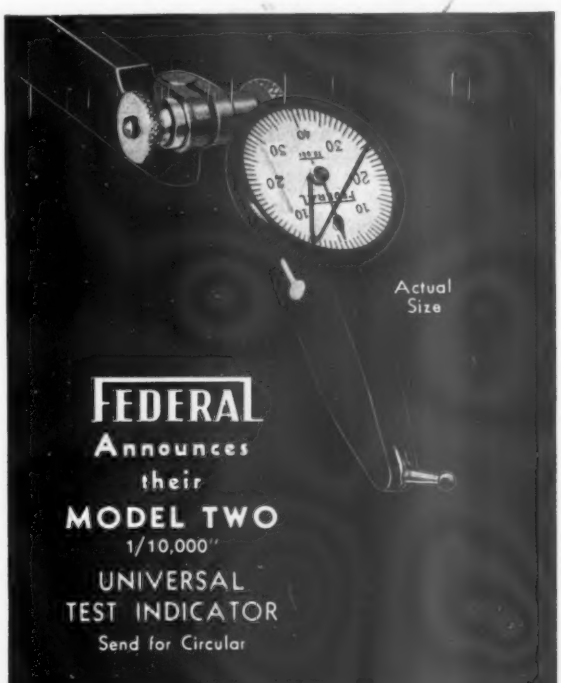

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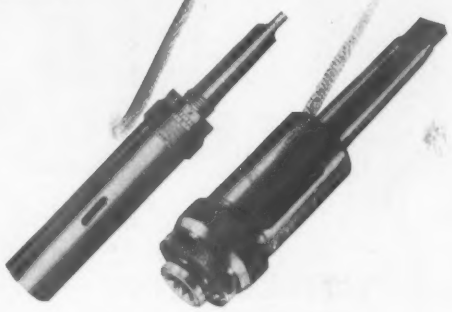

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Ideal for precision boring, internal grinding and honing machines.

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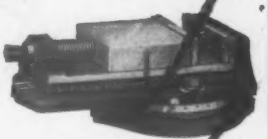
12 Sizes
From ¾ to 10 ton Pressure



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3½ to 8½ inch Jaws

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Shaper Vises
2 Sizes
12 and 14 inch Jaws

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Styles — to suit your installation.
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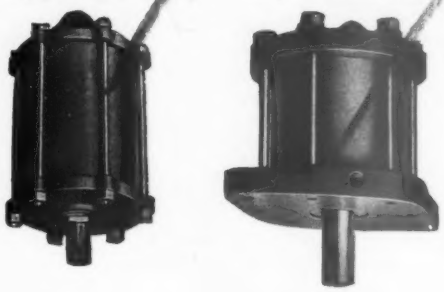

T-J NON-ROTATING DOUBLE ACTING AIR CYLINDERS

May we send you our catalog which gives the specifications of these cylinders?

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624 N. Mechanic St., Jackson, Mich.
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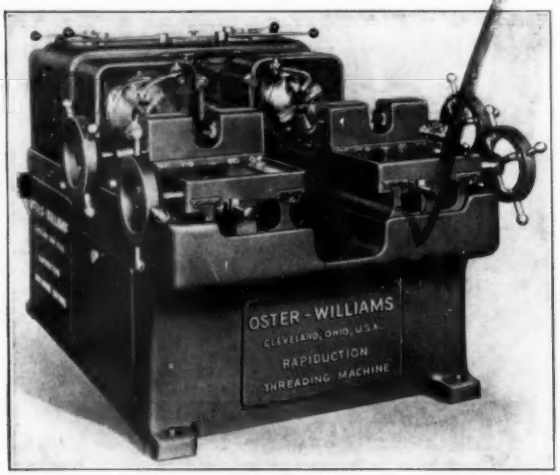

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292 Lafayette Street
Threading Headquarters Since 1893

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GRIPS AS STRONG AS SOLID STEEL
CONCENTRIC WITHIN .001
FOR END MILLS
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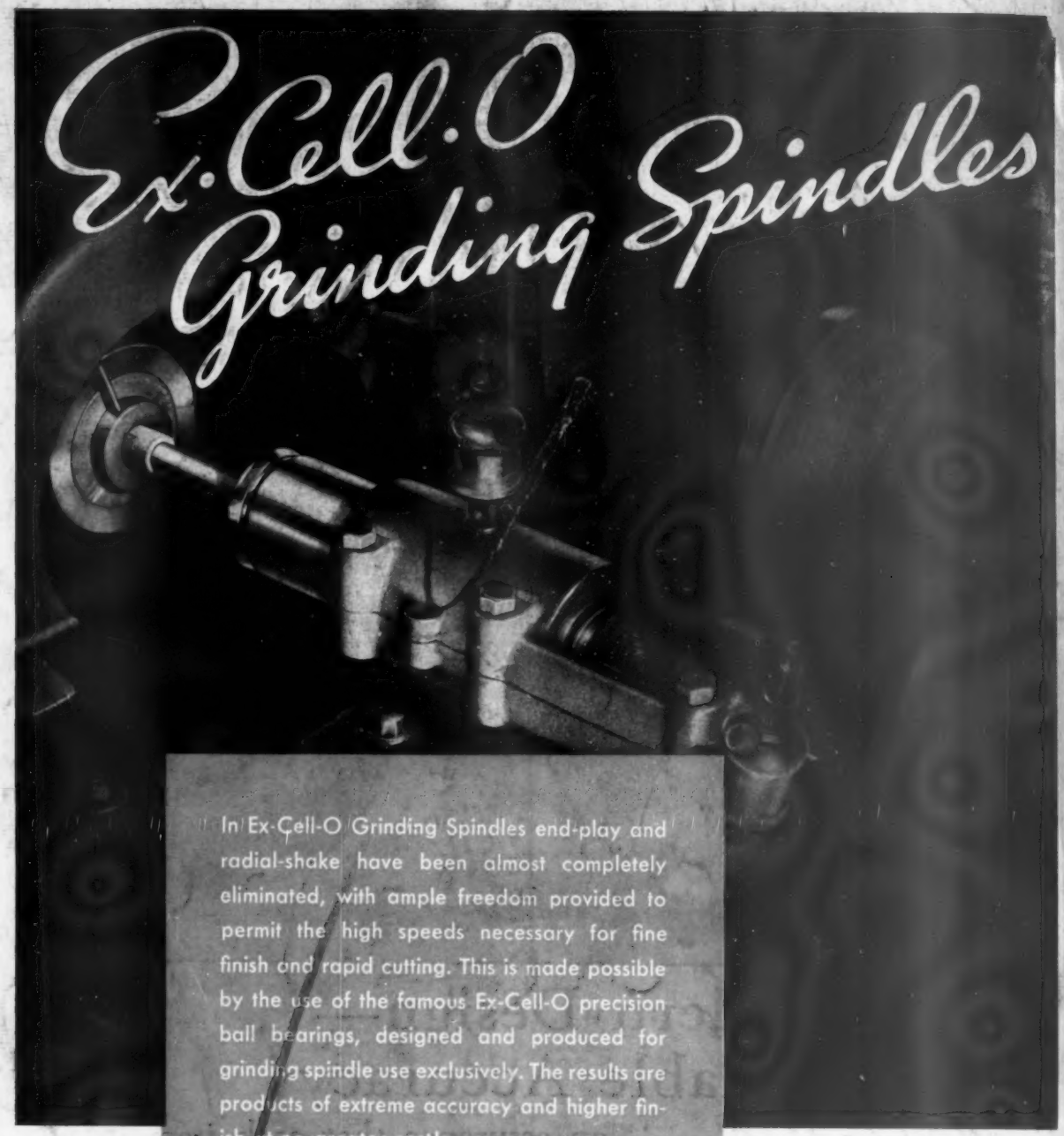
Catalog on request. Brown & Sharpe Mfg. Co., Providence, R. I.

BROWN & SHARPE TOOLS

Ex-Cell-O Grinding Spindles



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